TECH

PUBLIC LIBRARY
MAR 24 1938
DETROIT

NATIONAL PETROLEUM NEWS

Refining Technology

EDITION

In this Issue...

● How E. Texas Recovers Gasoline

100 million cu. ft. of gas daily is processed to recover up to 15,000 barrels of gasoline, from 13,000 wells in world's largest oil field; hundreds of miles of pipe used in gathering system R-121

● Handling 90-lb. Natural

Humble Oil & Refining Co. has completed 8-inch welded and cleaned line to transport 80-lb. to 90-lb. natural gasoline and propane-butane light products, from East Texas to Baytown refinery. All products received from two gathering systems metered into pressure storage; losses on volatile product are small. Specialized safety precautions used in operating to prevent accident and fire... R-115

● How and Why Still Tubes Fail

Twenty years ago the fabrication of still tubes began with plain carbon steel. In 1938 at least 20 different types of alloy tubes are available for every type of operation. How these tubes fail, or what compositions will not fail in given kinds of service is told here in detail R-132

● Alloy Steels for Every Still

A host of alloys, new and old, gives the refining engineer a wide choice of material, to obtain the best product for any given operating condition, at the lowest price.... R-132

● Treating with Plumbate

Oxidation of sodium plumbite to plumbate used in treating gasoline. No sulfur added to fuel, lead susceptibility increased without lowering octane number of fuel, author states R-139

Advertisers' Index ..... R-143 and 64

Editorial Index ..... R-113 and 24

MARCH 23, 1938

"Here's a Tip"

The Quickest Way To Bigger Profits.. NEW TOKHEIM PUMPS

If you are concerned about volume and profits we suggest you consider your island equipment. More and more each day motorists are favoring those stations with modern electric pumps. And operators are finding that Tokheim fills the bill best because Tokheim gives you not only striking appearance but GREATER DEPENDABILITY, PERMANENT ACCURACY, LOWER MAINTENANCE COST. Call your Tokheim man today or write the factory for literature.

Illustrated is Tokheim Model 36B Moneymaker. Available in any color or color combination. Choice of five domes.

QUALITY TOKHEIM
COMPARE THE VALUE!

GREATER DEPENDABILITY
PERMANENT ACCURACY
LOWER MAINTENANCE COST

TOKHEIM OIL TANK & PUMP CO.

DESIGNERS AND BUILDERS OF SUPERIOR EQUIPMENT

FORT WAYNE FOR 36 YEARS INDIANA

ON THE SEA
IN THE AIR
MINING
LUMBERING
On sea and land...in home and factory...for every lubrication and fuel problem, Shell has developed an answer.
NAPHTHAS
FUEL OILS
DIESEL FUELS
KEROSENE
GASOLINE
INDUSTRIAL
AUTOMOBILE LUBRICANTS
BRIGHT STOCKS
Nine strategically located SHELL Refineries
CALIFORNIA
COALINGA, DOMINGUEZ, MARTINEZ, WILMINGTON
GULF COAST
HOUSTON, TEXAS; NORCO, LA.
MID-CONTINENT
EAST CHICAGO, IND.; WOOD RIVER, ILL.; ARKANSAS CITY, KANSAS
SHELL
FACTORIES
ON THE ROAD
TRAINS
HOME

D. Oty Groce

D. OTY GROCE of St. Charles, the Groce Independent Oil Co., re-elected president of the Independent Oil Jobbers of Missouri at its convention last month, started in the oil business in 1931.

After serving overseas with the marines during the war, and graduation from the University of Missouri, Mr. Groce was a school administrator in various Missouri cities, and then was in the fire clay and brick industry. His oil company started as the St. Charles County Oil Co., and was changed Jan. 1, 1937 to the Groce Independent Oil Co. operating in seven counties adjacent to St. Charles. Cleanliness at his service stations and bulk plants is one of his hobbies.

News By Teletype From 4 News Bureaus

National Petroleum News

News From Oil Industry Everywhere

VOLUME 30 WEDNESDAY, MARCH 23, 1938 NUMBER 12

Mexico Seizes Oil Properties In Labor Fight

Oil Companies Seek Hull's Aid

BULLETIN

WASHINGTON, March 22. — State Department announced late today that four of the American oil companies whose properties had been expropriated in Mexico had filed a brief with Secretary of State Hull requesting diplomatic action.

The department said the brief was "in support of a claim of a manifest denial of justice."

The four companies were the Huasteca Petroleum Co., Standard Oil Co. of California, Mexican-Sinclair Petroleum Corp., and the Penn-Mex Fuel Co.

* * *

N. P. N. News Bureau

NEW YORK, March 22. — The first job of the new seven-man petroleum board, now administering the oil industry in Mexico after expropriation March 18 of foreign-owned oil properties, seemed to be to find foreign markets, while American and British companies looked toward diplomatic intervention to restore to them investments totaling $450,000,000.

Press dispatches late today from Tokyo quoted government sources as stating that expropriation proceedings were under scrutiny with the possibility in view of an oil import agreement between Japan and Mexico. Reports from Tampico, Mex., stated that a Japanese tanker Sunday was loading crude oil at the port of Tuxpan from the plant of the Mexican Eagle Oil Co. (Shell). Japanese tankers for some time have been transporting crude oil and its products from the Pacific Coast, but this is the first time that such a tanker has loaded a cargo of oil from a

(*Continued on page* 10)

Shun Dirty Toilets as Unsafe General Public Being Taught

Major Oil Companies Back Railroads At 6.6 Hearing

By Teletype
N. P. N. News Bureau

CHICAGO, March 22.—Two days of hearings here before ICC Examiner Disque brought out testimony from independent refiners and jobbers indicating that the actual weight of gasoline was around 5.9 to 6.0 pounds per gallon rather than the estimated 6.6 pounds used by the railroads in assessing freight charges on gasoline.

Major oil companies generally lined up with the railroads, opposing changes in the present estimated weights.

Two leading witnesses for the complainants testified that the weight of a tank carload of gasoline can be determined, without a track-scale weighing, through a hydrometer reading to determine gravity and weight.

For the railroads, who opened their defense late today, it was suggested that a cut in the estimated weight for gasoline would mean upward revision of the oil rate structure to compensate for the weight change.

Definite evidence on this point came from one rail wit-

(*Continued on page* 18)

Gallonage Rental Wouldn't Change IRB Rule, Is Hint

By Teletype
N. P. N. News Bureau

WASHINGTON, March 22.—The fact that the rental of a leased station was on a gallonage basis, rather than a flat monthly payment, probably would not make the operator an "employe" for social security tax purposes, if the supplier exercised no control, it was learned unofficially today at the Internal Revenue Bureau.

The IRB recently issued two rulings on the status of leased station operators (published in full text last week in NATIONAL PETROLEUM NEWS) one of which held that the operator was not an "employe" where, among other circumstances, the lease called for a flat rental. The other ruling, holding the operator was the supplier's "employe", involved a leasing arrangement with a gallonage rental, with the supplier setting the retail prices and otherwise "controlling" the station's operations.

Some companies, it was learned after the rulings were issued, found that their arrangements with leased station operators fulfilled all of the requirements of the IRB's "non-employe" ruling except that their rentals were on a gallonage basis.

While officials of the revenue bureau would not discuss the matter officially, it was indicated that they believed a gallonage rental, instead of a flat payment, would not have changed the ruling (S. S. T. 266) that the station operator was not an "employe".

The fundamental question according to the revenue bureau, it was indicated, is whether or not the supplying company exercises direction and control over operation of the leased station.

Contractual provisions—such as maintenance of the company's color scheme at the leased station — probably would not alter the status of the operator as an independent contractor, provided there was no control by the supplier, it was indicated.

Motorist's Standard Of Cleanliness Is Higher

N. P. N. News Bureau

CLEVELAND, March 21.—Through other avenues than the present wide campaign against syphilis, the consciousness of the motoring public is being aroused against unclean toilets as places to shun, and dirty and unkempt stations are synonymous in the public's mind with dirty toilets and restrooms.

To an increasing extent, during the coming motoring season, the oil companies and service station operators over the country will find tourists and even their regular customers also taking their gasoline and oil business where the appearance of the station property indicates the toilets are safe.

A Minimum Profits Standard in appearance and cleanliness will be necessary for the station that is going to hold its share of the trade, to say nothing of increasing its volume of sales; for the public is constantly being educated to demand a higher standard in sanitary conditions in toilets it uses.

This education is coming from state and local sanitary regulations which are constantly being enforced to improve the standard of toilets and restrooms which the public uses; through efforts of employers to better these facilities at their plants; through more general discussion on the part of the public on this phase of sanitation and so on.

In Texas, Dr. George W. Cox, state health officer, realizing that the general public had been aroused through the campaign of the U. S. authorities against

(*Continued on page* 13)

Mexico Seizes Oil Properties In Labor Fight

(*Continued from page* 9)

Gulf or Atlantic port, it was said.

Meanwhile, whether or not Japan would take Mexican oil, oil companies here were more fearful for the safety of their personnel and, secondly, of damage to property than over the success or failure of government operation of the refineries.

Oil Men Held

Reports that three officials of Standard Oil of New Jersey's Tampico plant were held prisoners by workers could not be confirmed, but Edward Borrego, assistant manager of the plant, was quoted as saying he had had a most difficult time getting to Tampico from the oil fields, where he had been at the time of the government's expropriation on March 18.

The first plane-load of British oil workers arrived in Mexico City Sunday and others were taken from Puerto Mexico to Vera Cruz. Some 35 American oil officials were refugees from southern Mexico, but in general Americans were more fortunate than Britons in taking precautionary measures, it was said, since the British had looked to a settlement of wage difficulties, and not expropriation.

The officials were ousted from the plants by union leaders of the oil workers syndicate, which set itself up as a "trustee" of oil properties for the Mexican government following President Lazaro Cardenas' expropriation decree March 18.

The principal companies affected by this seizure, accomplished under the Expropriation Law of the Mexican constitution, are Mexican affiliates of Standard Oil Co. of New Jersey, the Consolidated Oil Corp. (Sinclair), and the Standard Oil Co. of California. The Mexican companies of the Royal Dutch-Shell group represent virtually all the British capital affected.

Two-Year Fight

The fight which culminated in the nationalization of the Mexican oil industry began two years ago, when labor leaders demanded a blanket agreement covering the entire industry. This was followed by a 12-day national strike last May-June. The government intervened and a "committee of experts" examined the companies' books.

Following this, the Mexican Labor Board, Dec. 18, awarded pay increases of about $11,000,000 annually, the establishment of a thorough pension system, and awarded labor the right to participate in management affairs of the properties. This award was upheld March 1 by the Mexican Supreme Court.

In a last minute effort to avert the embargo of oil company property, prior to President Cardenas' expropriation order, the companies offered to pay the full award ordered by the Supreme Court on the condition that the clause giving the workers right to participate in management be eliminated. This offer was refused, and all negotiations were suspended.

Exhaust Legal Means

Foreign oil companies have since applied for an injunction against Cardenas' expropriation order, but this was believed to be merely a gesture as the companies must exhaust all legal means before the U. S. Department of State can act on their behalf.

In a statement March 19, W. S. Farish, president of the Standard Oil Co. of New Jersey, stated that the companies involved were not disposed to stand idly by and see their capital confiscated.

He declared that "the administrator who takes over the properties can no more operate them at a profit under the extreme conditions laid down for the companies than could the owners. Nor can he successfully surrender administrative control of operations to workmen inexperienced in business management. This is recognized in Mexico. The Mexican press reports that the oil workers now in possession have decided as a first step to reduce the personnel by fifty per cent and to withhold twenty-five per cent of the wages retained to indemnify their comrades."

"On March 1," Farish's statement continued, "the Supreme Court of Justice in Mexico handed down a decision denying an injunction asked for by the American and British oil companies to forestall seizure of their properties.

"It is not necessary again to go into the history of the long struggle which has been carried on by the petroleum companies in the effort to reach an amicable agreement with the government in respect to exorbitant demands made in the name of the workers. Two of these conditions were manifestly impossible of acceptance. One would have essentially removed from the management all control of operations and personnel. The other would have increased costs by approximately 41,000,000 pesos per annum, which is nearly twice the earnings the industry has averaged over the past three years. This despite the established fact that Mexican petroleum workers have long been a favored class, receiving roughly twice the wages paid for comparable labor outside the petroleum industry.

"Under the award, this disparity would have become approximately three times the prevailing wage scale elsewhere in Mexico. The oil companies see no chance to make up any of this increased cost of production and manufacture, since the Mexican Government has hitherto arbitrarily fixed a very low price at which products must be sold throughout the Republic of Mexico and has given no indication of departing from this policy in the future.

"In a final effort to adjust the situation, at the suggestion of the U. S. State Department and at the invitation of the Mexican Government, the companies sent a representative to Mexico City empowered to discuss any concession within reason. His last offer was rejected.

"The oil companies made an earnest effort to secure a fair hearing before the Supreme Court, and as a guaranty of their good faith put up a bond of 3,000,000 pesos. Nevertheless, Lombardo Toledano, the radical labor leader, confidently announced 8 days in advance of its delivery the decision of the Supreme Court. President Cardenas himself confirmed Toledano's prediction 6 days before the court pronounced its decision. And Supreme Court Justice Icaza, on the day of the decision, frankly said in open session of the Mexican Supreme Court that a verdict against the companies was a political convenience."

Mexican Labor Leader Wires C.I.O.

NEW YORK, March 21. — Vincenta Lombardo Toledano, secretary of the Mexican labor union, telegraphed C.I.O. Leader John L. Lewis for "moral aid for Mexican people" in the current expropriation of foreign oil properties.

Wired back Lewis to Mexico City: "It is the conviction of the C.I.O. that both labor and employers should abide by decisions of legally constituted authorities in democratic nations. The C.I.O. has consistently accepted the decisions of tribunals to which it has submitted its cases."

FDR Balked In Efforts to Cut Fund for Roads

N. P. N. News Bureau

WASHINGTON, March 21.—President Roosevelt has admitted defeat in his effort to have Congress cancel the $238,000,000 in federal highway aid authorizations for the coming fiscal year, beginning July 1.

The President asked Congress, in a special message to the special session (N.P.N. Dec. 1, 1937, p. 11), to cancel these authorizations as an "economy measure." No action was taken on the request at the special session, and on Dec. 31 Agriculture Secretary Wallace sent to the governor of each state a letter telling him what his state's allocation under the fund was to be for the coming fiscal year, but urging that no projects be submitted under the allocation until after the regular session of Congress had had time to act on the request.

Apparently convinced that the present session plans to do nothing about the requested cancellation, the president according to a letter just sent all the governors, "now feels that you should not be asked to further delay the submission of road-building projects of your state." The secretary further requested the governors that such projects be submitted now.

Accordingly, the federal aid for highways for the coming fiscal year as authorized more than a year ago by Congress will go through as planned.

Report Expected Soon

The report of the House Roads Committee on the bill of its Chairman, Wilburn Cartwright (Okla.), making authorizations for federal highway aid during 1940 and 1941 on the same basis as the 1939 authorization is expected to be made late this week.

Cartwright's committee held lengthy hearings on this bill, and, despite Presidential recommendations that federal expenditures for roads be cut to $125,000,000 a year during 1940 and 1941, it is expected that the authorizations for those two years carried in the bill as reported will be somewhat larger than that figure—if not, in fact, as large as the 1939 authorization.

ICC Asked To Suspend Hike In Freight Rates

By Teletype
N. P. N. News Bureau

WASHINGTON, March 22.—Three requests for suspension of the 10 per cent increase in rail freight rates on petroleum products included in tariffs filed with the Interstate Commerce Commission under authority of its order in the freight rate increase case had been received by the Commission's Suspension Board today, and, judging from reports reaching Washington from jobber associations and others, there will be more before the effective date of the new rates—March 28.

Two of the requests, both from Wisconsin, ask suspension of the increases until after decision of the weight-of-gasoline cases now being heard at Chicago by an ICC examiner.

The third asks suspension of the effective date until after a correction is made in the rates as adjusted for fractions. This protest and request for suspension was filed by Russell B. Brown, general counsel of the Independent Petroleum Association of America, at the request of Calumet Refining Co. Calumet wired Brown to tell him that, through the adjustment made for fractions of cents resulting from the rate increase, its rate on crude oil from producing areas was raised from 25 cents per 100 pounds to 28 cents per 100 pounds, an increase of 12 per cent instead of the 10 per cent authorized.

In connection with their master tariff, the railroads filed a long and complicated table to adjust for rates in fractions of cents resulting from the increase. In some instances, the "adjusted" rates, as shown by this table, favor the shipper—that is, make the increase less than 10 per cent—but in Calumet's instance, the company claims the increase is larger than granted by the commission.

Brecke Writes Letter

A letter from Roy L. Brecke, executive secretary of the Wisconsin Petroleum Association, was the first request for suspension of the increased rates received by the commission. Brecke said that his association, representing some 380 jobbers, had voted unanimously to request the suspension "at least until adjustment of the present estimated weight cases."

If the increase is granted, the refineries and distributors who transport their oil by pipeline "will have an even greater advantage and opportunity to put the independent jobber out of business," Brecke said, pointing out to the commission that "the jobbers of petroleum products, as you know, whose price is based on tank car price plus railroad rates, will be ruined and forced out of business and it will be a downward trend toward complete destruction."

Brecke said "it has also been suggested that the association call upon the congressmen from Wisconsin for national legislation to tax pipeline operators in a measure equal to the difference in costs between transportation by pipeline and by rail."

Another request for suspension has come from the Depies Huis Oil Co., New Holstein, Wis., in the form of a telegram urging the commission to "suspend the increase in freight rates on petroleum products until the case attacking legality of present 6.6 pounds per gallon estimated weight pending before the commission be disposed of."

Reports have been received here to the effect that jobbers' associations in Illinois and Indiana also planned to petition for suspension of the increased rates, but it was said at the commission today their requests had not yet been received.

None of the requests thus far received have been acted upon by the ICC Suspension Board, although it was said they will be considered later this week, since the new rates are scheduled to become effective next Monday, March 28, and if suspended, must be acted upon before the effective date.

National Gas Products Association has petitioned the commission to suspend the 10 per cent increase as applied to carbon black rates, but this has not yet been acted upon either. The association's petition points out that in a decision on February 14, the commission refused to grant the railroads an increase in rates on carbon black amounting to approximately half the amount granted in the general rate increase case, and adds "obviously, if a 5 per cent advance is condemned in February, an advance of 10 per cent in March should be made subject to investigation and hearing."

A "master tariff" for common carrier truckers, embodying the same 10 per cent increase in rates on petroleum and other products as was granted the rails, has likewise been filed with the commission, with the same effective date, but as yet no petitions for suspension of the oil truck rate increase have been received.

House Passes Bill For Probe of Auto Firms

By Teletype
N. P. N. News Bureau

WASHINGTON, March 22.—The House late today passed the Withrow resolution directing the Federal Trade Commission to investigate the "policies employed by manufacturers in distributing motor vehicles, accessories and parts, and the policies of dealers in selling motor vehicles at retail, as these policies affect the public interest."

The resolution points out that the probe's purpose is to determine the "extent of concentration of control and of monopoly," and the extent "to which the anti-trust laws of the United States are being violated," and provides $50,000 for the investigation.

A companion resolution on the Senate side of the Capitol, introduced by Senator Minton, Indiana, has been favorably reported by the Senate Interstate and Foreign Commerce Committee, and is on the Senate calendar.

R-P Law Complaint Is Being Studied

N. P. N. News Bureau

WASHINGTON, March 21.—A copy of the complaint by the South Carolina Independent Oil Jobbers Assn. to the Federal Trade Commission charging major oil companies in South Carolina with violating the Robinson-Patman law through "excessive" discounts to commercial consumers and "favoritism" of certain retailers, has been received at the Department of Justice and referred to the anti-trust division, it was learned today. Officials of both the FTC and justice department declined to discuss the complaint. (See N.P.N., March 9, for details.)

FTC Bill Signed

WASHINGTON, March 22.—President Roosevelt today signed the Lea Bill broadening the powers of the Federal Trade Commission to include "unfair acts and practices in commerce" as well as "unfair competition" as covered by present law.

New Truck Law Nears Passage

By Telegraph

COLUMBIA, S. C., March 21.—Advocates of the proposed law to increase the maximum weight for trucks on South Carolina highways from 20,000 to 40,000 pounds said today they are hopeful of action in the State House of delegates soon, following passage of the bill by the Senate last week. The bill would also increase the maximum width from 90 to 96 inches.

The present 20,000-pound-90-inch law, which was upheld by the U. S. Supreme Court several weeks ago, has the effect of barring from South Carolina's highways more than half of the trucks which would otherwise use them — for both interstate and intrastate state operations. Many large oil transport tank trucks are barred under the law which it is sought to amend.

Meanwhile, the Supreme Court has "broadened" the hint which it gave the Interstate Commerce Commission to take over the regulation of sizes and weights in its opinion in the South Carolina case.

By a slight change in the language of the majority opinion, which upheld the state's right to make such regulations, the court made that portion read:

"Appellees do not challenge here the ruling of the district court that Congress has not undertaken to regulate the weight and size of motor vehicles in interstate motor traffic, and has left undisturbed whatever authority in that regard the states have retained under the constitution."

This was taken, along with the rest of the opinion, to mean that if Congress, through the ICC, undertook to establish federal size-and-weight restrictions, it might alter the circumstances under which the opinion upholding the states' regulatory powers was given.

The American Trucking Associations, Inc., and other interested groups are drafting a proposed bill to be presented to Congress which would direct the ICC to establish such federal size and weight regulations.

Atlantic Official Dies

PHILADELPHIA, March 21.—A. B. Johnson, 51, export sales department of Atlantic Refining Co. died March 20 at the Bryn Mawr Hospital in Bryn Mawr, Pennsylvania, a suburb of Philadelphia following an operation for appendicitis a week ago.

Proponents of 'Alky Gas' Keep It Before Congress

N. P. N. News Bureau

WASHINGTON, March 21.—With "alky-gas" agitation in the corn belt worked up to mid-summer heat at the prospect of a new Agrol plant at Sioux City, and other developments, the friends of alcohol-blended gasoline in Washington have been keeping it before the nation's lawmakers as each advanced his own pet plan for federal subsidization of the alcohol-from-farm-products industry.

No less than four such plans are before the Congress now; three of them products of the past few weeks.

The fourth has been before this session and previous sessions of Congress, but as yet no action has been taken on it, although it is understood to have some sort of blessing from the Agriculture Department.

This is the Lea "fuel research" bill, authored by Cong. Clarence F. Lea, Calif., which provides for spending $1,000,000 of the funds collected in processing taxes under the now-defunct Agricultural Adjustment Act for research into "development of renewable sources of fuel supplies of agricultural origin for internal combustion engines and other power purposes. . . ."

The Lea bill was referred to Lea's committee, the House Interstate Commerce Committee, which submitted it to the Agriculture Department for approval, as is the custom with bills affecting any of the departments. The Agriculture Department, whose Bureau of Chemistry and Soils would make the investigations, submitted the bill the Budget Bureau for an OK, and it is understood that it has now gone back to the Agriculture Department, which has indicated it will not oppose the measure if and when brought up in committee on or the floor.

No Hearings Set

No hearings have been set, however, or any other action taken to indicate whether the bill may be taken up before it dies with the end of this session or not.

Two of the other three alky-gas bills before Congress concern taxation, and have been referred to the House Ways and Means Committee, which has indicated no disposition to do anything about them.

An attempt by its author to slip one of these into the tax revision bill during its consideration on the floor of the House two weeks ago was defeated without a record vote, despite a lengthy speech on the floor in its behalf by Cong. Vincent F. Harrington, Ia., who introduced the measure.

Harrington's bill, whose companion in the Senate, introduced by Sen. Gillette, Ia., has been referred to the Senate Finance Committee, would exempt from the federal gasoline tax all motor fuel containing a blend of 10 per cent or more of alcohol made from agricultural products.

The other bill concerning taxes was introduced by Cong. Harold Knutson, Minn. It would make it unlawful to sell any gasoline not containing a blend of at least 10 per cent alcohol made from farm products, and, in addition, would tax any such unblended fuel at the rate of 10 cents a gallon, thus swinging a two-edged sword in both directions simultaneously.

Fourth alky-gas subsidization measure and most recently introduced, comes from the pen of Michigan's Sen. Arthur Vandenberg, whose bill would amend the Reconstruction Finance Corp. act to permit the corporation to make loans to any "chemurgic" industry—defining chemurgic industry as an industry which transforms agricultural products to industrial uses through chemistry.

Sees "1000 Agrol Plants"

In introducing his bill, Vandenberg quoted "competent experts" as saying that "if a 10 per cent alcohol blend were used nationally, it would ultimately require 1000 Agrol plants having a capacity of 10,000 gallons each daily," and pointing to the enormous quantities of agricultural products these would use up. Vandenberg's bill has been referred to the Senate Agriculture committee.

Harrington's half-hour speech on the benefits of alky-gas was of the same tenor with Vandenberg's introductory statement. In it he declared that the alcohol-blend was the "key to agricultural recovery and national prosperity," and described the proposed Sioux City plant to his colleagues.

In addition to these four pending bills, there is other alky-gas news brewing in Washington.

When Congress passed and the President signed the Agriculture bill, it provided for $4,000,000 annually for the construction and operation of four laboratories to experiment with industrial uses for farm products. None of these four has been "located" as yet, although the bill provided that one should be in each of the four chief agricultural sections of the nation. One of these may be an alky-gas project.

Meanwhile, the Bureau of Chemistry and Soils is completing a "paper study" of current literature on "alky-gas", and goes into costs of production, types of farm products which may be used for commercial alcohol, behavior of alcohol in an internal combustion engine, developments abroad, and other topics.

Government-like, the Bureau will not say when it will have the study completed and ready for release, although it indicated that it may be sometime this summer or fall.

Ellick Botts Hospitalized

TULSA, March 22.—Ellick Botts, alias Lawrence E. Smith, manager of the Mid-Continent news bureau of National Petroleum News, is convalescing in Morningside Hospital here from an appendicitis operation performed March 16.

WASHINGTON, March 21.—Sales of gasoline to the New York World's Fair of 1939, Inc., are subject to the federal gasoline tax, according to an IRB ruling obtained by the National Petroleum Assn.

Hearings Sought On Biermann Bill

N. P. N. News Bureau

WASHINGTON, March 21.—The House Interstate Commerce Committee may decide at an executive session this week or early next when or whether it will hold hearings on the bill of Cong. Biermann (Ia.), to divorce the marketing branch from other branches of the petroleum industry.

Resolutions urging passage of the bill are being received by Congressmen from the several associations of independent jobbers which have been meeting during the past several weeks, and it is hoped by the measure's sponsors that these will serve to impress members with the jobber support of the bill sufficiently to secure hearings and a subsequent favorable report to the floor.

Chairman Clarence F. Lea (Calif.) several weeks ago assured Biermann by letter that his committee would consider the bill. This was interpreted as meaning they would consider whether to hold hearings.

Meanwhile, in the Senate, Sentor Gillette (Ia.), author of a companion to the Biermann measure, has assured Biermann and other advocates of marketing divorcement that he is pressing for a hearing on his bill in the Senate Judiciary committee, to which it was referred on introduction.

T. W. Arnold Sworn In As 'Trust-Buster'

N. P. N. News Bureau

WASHINGTON, March 21. — Thurman W. Arnold, 47-year old Yale law professor "drafted" to head the New Deal's "trust-busting" activities, was sworn in today as assistant attorney general in charge of the justice department's anti-trust division.

Arnold takes over the reins at a time when oil anti-trust investigations are under way on the East Coast and West Coast and several oil cases—the Ethyl gasoline case at New York and the second indictment at Madison, Wis., involving jobber contracts, are pending in court.

The East Coast oil probe has been ripening for some weeks, with further steps expected at anytime. (For details of oil investigations, see N.P.N., Feb. 16, P. 9)

Flannery Pledges Fight For Fuel Oil Tax

N. P. N. News Bureau

NEW YORK, March 19. — Congressman J. Harold Flannery, Penna., whose amendment to the tax bill embodying the Boland fuel oil tax proposal was overwhelmingly defeated in the House last week, pledged a continued fight for the scheme to "equalize" competition between coal and oil at the annual meeting here March 15 of the New York Coal Merchants Assn.

Predicting 50-cent gasoline with "rapidly dwindling" supplies of oil, Flannery, to the enthusiastic applause of the coal dealers, declared that the proposed fuel oil tax was a "conservation" measure and would bring in $168,000,000 a year in revenue, besides increasing employment in the coal mines and railroads.

Minimum Profit Standards

For Station Site . . .

No empty cans, rags, or rubbish on drive.

Curb and drive edges clean and whitewashed.

No wet or dried grease or oil spots on drive.

Floodlight reflectors clean, lights in good condition.

Pump island clean and whitewashed frequently.

No discarded cans, pails, or rags on pump island.

Pumps washed frequently.

Pump hose free from leaks and not frayed.

Pump globes and lights in good condition and clean.

Fence, wall, hedge, or garden in well kept condition.

Air hose picked up and in good working order.

Curb and street signs freshly painted and well lighted.

Fill box openings painted and free of dirt.

For Station Building (Exterior) . . .

All unsightly and poorly painted signs eliminated.

Building surface free from splatters.

No chipped or broken exterior wall surfaces.

Roof in good condition.

All empty or unkept cans, barrels or boxes out of sight.

Windows clean.

For Station Building (Interior) . . .

Walls, floors and ceiling clean, with no grease spots.

Office equipment well kept, with no loosely filed papers in evidence.

Manager's desk clean, with no milk bottles, coffee cups, newspapers, rags, lunches, or tools in evidence.

Conservative use of signs, cards and wall charts.

Attendants' street clothing and miscellaneous stock kept out of sight in closet or storage room.

Pit or lift well cleaned after each job.

Lubritorium floor cleaned after each job.

Lubritorium walls, ceiling and floor well painted.

Stock of tires, batteries, and accessories neatly arranged and CLEAN.

Work bench cleaned off after each job and tools put in proper place.

Grease guns in proper place on clean rack when not in use.

High-boys with no oil spillage on top, front or sides.

Container for oily rags and rubbish freshly painted and with a lid or self-closing top.

Waste basket in office.

Comfortable and CLEAN chairs for customers.

Window displays that are timely, and not piles of a mixture of winter and summer items.

All miscellaneous items, not necessary to the immediate job of serving customers, out of sight, including such items as brooms, mops, step ladders, and overalls.

Lamp bulbs in good condition and light fixtures clean.

Lubritorium and other service bay entrances unobstructed.

No odds and ends lying around, such as old second-hand tires, scrap parts, junk, or old batteries.

Compressor clean, and located where noise will not interfere with conversation with customers.

For Station Toilets and Wash Rooms . . .

All toilets in **Good Repair.**

Wash bowl fixtures in **Good Repair.**

Toilet and wash bowls **Spotlessly clean.**

Toilet seat freshly painted and clean.

Floors, walls and ceiling clean.

No litter in the rooms.

Do not use rest rooms to store **Anything.**

Rooms and fixtures inspected, **Frequently Each Day.**

Clean rest rooms at least **Once a Day.**

Supply soap and towels (paper towels at least).

Rooms should always **Smell Clean.**

For Personnel . . .

Uniforms and caps CLEAN.

Attendants clean-shaven.

No dirty rags in attendants' pockets.

Public Shuns Dirty Toilets As Unsanitary

(*Continued from page 9*)

venereal diseases, has launched a campaign to have dirty restrooms cleaned up or eliminated from the highways.

He has enlisted the newspapers widely in his campaign and is urging the public to report to his department instances of unsanitary toilets. A Texas statute gives him authority to bring the owner of such a place into court on the charge of maintaining a nuisance, subject to fine if he is found guilty.

Kansas Sets Standard

State health officials in Kansas have notified the oil marketing companies as to what was expected in the way of clean service stations and restrooms. Specific complaints are being investigated and the violator who does not clean up his premises within a reasonable time is subject to a fine and jail sentence to boot.

The factory inspection division of the Illinois state health authorities is writing a new code for sanitary conditions of toilets and restrooms through its state industrial commission, which code is to include service stations, it is announced, as being places of employment.

State health regulations in Wisconsin also look upon service stations as places of employment and announce they will take greater pains to insure that toilets there comply with the general regulations which go into detail as to size of the room, ventilation, fixtures and so on.

California state authorities take the view they have the right to supervise sanitary conditions at service station toilets under a statute there pertaining to towels and drinking cups. For any service station in this state which sells anything that might be considered as an article of food, specific regulations apply as to the toilets.

That great class of gasoline and oil customers, the workers in factories and industrial plants over the country, has been educated to improve standards in station toilets through local factory inspectors in all large cities and many smaller towns who demand that the facilities in the plants where these workers are employed be held to rigid sanitary standards.

Frequently these workers have had more education in public sanitation than any other class of the public. Certainly their standard has been lifted to a greater extent in recent years. Employers themselves have taken a great part in this education, working through the local safety councils of the National Safety Council. They have adopted and maintained, in the interests of employes' health and safety, rigid standards for toilet and restroom construction and cleanliness through inspection.

A.A.A. Takes A Hand

The American Automobile Assn., the national organization of local automobile clubs over the country, has taken steps to improve sanitary conditions in station toilets and restrooms, in the interests of motorists generally. Its headquarters told NATIONAL PETRLEUM NEWS that it had watched for some years for indications of improved conditions in station toilets and recently decided that it was called upon itself to take corrective action.

It is now drafting a model highway development and control bill, which will be submitted to the individual states, calling upon them to inspect "roadside catering places, rest rooms, comfort stations, and places of a similar nature in rural districts," and to adopt regulations governing their appearance and sanitation, where necessary.

The extent of the interest being aroused in the syphilis control campaign of the federal authorities is indicated by figures from the Chicago area of the Illinois Social Hygiene League for the past 14 months. Over 100,000 persons have attended lectures on the subject. In 1937 under its auspices there were 1115 meetings, attended by 93,629 persons.

The campaign of the federal authorities against venereal diseases is just getting under way. Through it especially the public's age-old fear that unsanitary and dirty toilets may be unsafe toilets is being heightened. This campaign and the growing interest of state and local authorities in the maintenance of strict sanitary conditions at all toilets and restrooms the public uses serves to make necessary immediately the highest possible **Minimum Profit Standards** for the appearance of service station toilets and the stations themselves.

In following articles in this issue of NATIONAL PETROLEUM NEWS is described the growing interest of many agencies in this question of sanitation of service station toilets and there are also reprinted the **Minimum**

Public Is Being Educated To Shun Dirty Toilets

Profit Standards for service station appearance, both inside and outside, and for station toilets, which were first published a week ago. These standards do not call for the expenditure of a single penny, other than possibly for soap and a scrubbing brush; and for only a little greater effort in this direction on the part of the station operator.

These **Minimum Profit Standards** will insure to oil companies and station operators that their stations and toilets are meeting the level in sanitation and appearance demanded by a public which is constantly growing more critical on this subject.

Baltimore Regulates

BALTIMORE, Md., March 22.—Service station rest room facilities here are covered by the general sanitary laws of the city of Baltimore, which call for periodic inspections of these toilets as well as those in all other buildings, and give the city health officer discretionary authority over what he deems "adequate sanitation." Here, as elsewhere, inspections by food inspectors of those places which sell food in connection with sales of gasoline and petroleum products serve as a "double check" on toilet facilities.

Toilet Clean-up Drive Is Praised By A. A. A.

N. P. N. News Bureau

WASHINGTON, March 21.—The American Automobile Assn. headquarters here stated today that complaints by motorists to its member clubs about unsanitary toilet facilities in service stations and at roadside establishments catering to the motoring public were on the increase.

The A.A.A. also expressed gratification at the undertaking by NATIONAL PETROLEUM NEWS to bring about a voluntary "sanitization" of the facilities on the part of service station owners, operators and attendants in the interest of better service to the public.

The tourist and the motorist generally have come to expect the utmost in service from the service stations particularly, because of the reputation which oil companies have built up over a period of years; but the increasing number of complaints coming in to motor clubs over the country, the Association said, indicates that there has been a noticeable let-down, particularly in cleanliness and sanitation of toilet and rest-room facilities.

The responsibility, of course, the A.A.A. pointed out, rests with the individual operators of these roadside establishments—whether they dispense gasoline, or root beer, or both—but the motorist is becoming more careful where he stops for gasoline, or for refreshments along the road. He waits until he comes to the places that "look" clean.

The association pointed to the figures showing that, during the depression of the early 30's, touring expenditures suffered least of all "amusement" expenditures—less, even than movie attendance.

Projecting this situation into the coming summer, the association said the establishments catering to tourists were not likely to feel the recession nearly so much as those offering other diversions.

But it will be the clean-looking, well-kept establishments which get the bulk of this business, it added.

In its expression of gratification at the campaign of NATIONAL PETROLEUM NEWS for clean rest rooms and general improved appearance of filling stations, the association pointed out that Article IV of its "Bill of Rights for Motorists", adopted at the 1936 annual convention, stated:

"Necessary consideration must be given to adequate sanitation along the roadside and appropriate roadside development."

This bill of rights, the national motoring body said, represents the concensus of thought among motorists of the country, as represented by the officials of their local motoring clubs assembled in the A.A.A. convention.

"It represents the growing consciousness of the motoring public that it is high time for operators of roadside establishments—and this includes a large number of filling stations — to recognize the prime importance of cleanliness, not only as a means of protecting their customers but also as a means of increasing their patronage," the association stated.

Seeks Adequate Sanitation

A model highway development and control bill, now being drafted by a special committee of the A.A.A., suggests definite ways in which adequate sanitation at service stations and roadside stands can be carried out. This model bill has not yet been formally adopted by the automobile association but its principal provisions are said to be in line with the thought of motor club officials throughout the country. Article Six of the proposed bill provides:

"The (State highway) Commission shall adopt regulations governing the appearance and sanitation of all roadside catering places, rest rooms, comfort stations, and places of a similar nature in rural districts, and shall cause to be made periodic inspections of such places. It shall provide in said regulations a penalty not in excess of $100 to be levied against any person found maintaining such an establishment which does not fully comply with said regulations, and may cause to be closed any such place which it determines to be in an unsanitary condition until the owner or persons maintaining same place them in a clean and sanitary condition."

'Clean and Wholesome,' Is D. C. Requirement

N. P. N. News Bureau

WASHINGTON, March 21.—With filling station facilities already covered by the District of Columbia's general sanitary regulations, which give the local health officer authority to close any such establishment where sanitary facilities are not, in his opinion, "clean and wholesome," D. C. officials said today they are working for regulations which will give them authority to require "adequate" toilet facilities for the parking lots and used-car lots which dot the city.

Under present regulations, inspections by the officers are confined to "buildings", but the proposed extension would give them authority to inspect used car and parking lots and require rest rooms and other sanitary facilities.

Syphilis Drive Arouses Public In Mid-West

N. P. N. News Bureau

CHICAGO, March 19.—Venereal disease has been grabbed by the scruff of the neck and thoroughly exposed to the people of Chicago and the Middle West.

To the petroleum industry, arousing of the public here against venereal disease is a clear warning to clean up service station rest rooms and to keep them clean.

The natural inclination of the public is to link filth with diseases. Whether the public is right or wrong in believing disease can be transmitted by visible filth, unclean places are shunned.

For the second year the venereal disease control campaign is being waged here, through authoritative illustrated lectures, through voluntary blood tests, and through widespread publicity in the metropolitan press. Right now lectures are appearing before groups many nights a week, discussing syphilis.

Last week two department stores, a dairy company, two mail order houses and a newspaper announced recommendations that employes take blood tests.

Four Agencies

The public has been informed about syphilis through illustrated lectures given by four agencies; the Venereal Disease Commission of the Chicago Medical Society, the Illinois Social Hygiene League, the American Social Hygiene League and the educational department of the Illinois State Medical Society.

Lectures are given before diversified groups, such as women's clubs, gatherings of young people, luncheon clubs, and business men. That the campaign has attracted great attention is exemplified by the questions asked after the illustrated lectures, reported Dr. Louis D. Smith, chairman of the Chicago Medical Society venereal disease commission. Lectures last 30 to 45 minutes. The question period often con-

States Are Campaigning For Clean Rest Rooms

tinues for an hour or more.

The society's interest in the campaign started, Dr. Smith explained, with the issuance of the U. S. Public Health Service questionaire to determine the extent of syphilis. The society canvassed doctors to determine how many were in a position to co-operate in the drive for free blood tests. In special session in June, 1937, the society voted to do its part in the campaign and the commission was established.

City Has Campaign

The public has been informed about syphilis also through efforts of the city and a WPA project.

The city's participation started in January, 1937, with Edward J. Kelly, Chicago mayor, establishing a syphilis control commission. Dr. Louis E. Schmidt, secretary of the board of health, is chairman, and the original membership of 60 was expanded quickly to 300.

A four-months survey started in March, 1937, to determine the extent of syphilis through a study of clinic and doctors' records. The survey showed about 19,000 cases, with the annual treatment load at about 15,500.

In July, 1937, the city and the WPA project began distribution of 1,000,000 questionaires to determine who would be willing to submit to a secret blood test. Figuring an average of four persons per family, virtually every home in Cook (Chicago) county was reached.

The state brought venereal disease before the public last year with a law requiring both men and women to be free of venereal disease before a marriage license would be issued. The rush for licenses before the deadline, and later the elopements to Indiana resulted in much local publicity. All the highlights of the local campaign sketched above have been made known to the general public.

As a result of the strenuous campaign here, with the widespread publicity, the old taboo on the word syphilis has disappeared. The word appears in newspaper headlines, and there is no snickering when the word comes up in a conversation.

The public has accepted the campaign for bringing the disease to light and controlling it, the same as any disease. This is the public that drives motor cars, buys gasoline at service stations, and wants clean rest room facilities.

Texas Enlists Newspapers In Drive to Clean Toilets

N. P. N. News Bureau

TULSA, March 21. — A vigorous campaign to eliminate dirty restrooms in Texas already is in full swing, under the guidance of Dr. George W. Cox, state health officer, and his corps of inspectors.

Dr. Cox some time ago realized the psychological advantage to be gained by tying into the U. S. drive against venereal diseases a state campaign to get the dirty rest rooms cleaned up.

The fact that his department was handicapped by lack of sufficient funds to maintain a corps of inspectors sufficient to cover the entire state thoroughly did not deter Dr. Cox. He went to the daily newspapers and gave them good "copy". He went direct to the public by whatever means were available.

Tied into his interviews was the constant appeal to citizens of the state for co-operation in his campaign to clean up the dirty restrooms used by the public in cafes, taverns, service stations and retail establishments.

"The state is large and our funds so small we cannot make frequent inspections of all public restrooms," Dr. Cox told Texans time and again. "But you can help us protect you and your loved ones if you will complain of unsanitary conditions, not only to the owner of the dirty restroom, but to our department at Austin."

Interest Heightened

Dr. Cox realized also that the educational campaign being conducted by the U. S. Department of Public Health was putting a sharper tooth in the Texas statute under which he could prosecute owners of unsanitary restrooms. This is the Sanitary Code which permits him to bring into court the owner of a dirty restroom on a charge of maintaining a nuisance. Conviction subjects the owner to a fine of $10 to $100.

The State Commissioner of Health in Oklahoma is given about all the latitude one would desire in dealing with dirty restrooms. He is authorized by law to make any rules and regulations he deems necessary to protect the public health. Violation of his rule after one notification to "clean up" results in the individual being brought into court and, upon conviction, fined and his place of business padlocked if the commissioner deems such a step necessary.

Health officials in Kansas, also handicapped by small funds and personnel, have sought co-operation of the larger oil marketing companies in an effort to keep service stations clean. The health authorities outlined to the oil companies what was expected and the oil companies in turn notified their dealers and agents of the regulations.

Co-operate in Kansas

"The result is a fairly uniform cleanliness among the larger companies' stations," a Kansas official said. "Our greatest trouble now is with the small independent operator who doesn't really mean to have his restroom dirty but who has to be wading in dirt before he thinks a place is dirty."

The Kansas officials are reported to be exceedingly prompt in investigating specific complaints. Where conditions are found unsanitary the inspectors sometimes prevail upon the owner to "close up" for a couple of days and clean up under the supervisions of the health officials. In other instances charges are filed and, upon conviction, the violator is subject to a fine of $10 to $100 and a jail sentence not to exceed 30 days.

An interesting point brought out by one of the Kansas officials was the fact that a large number of their specific complaints about dirty rest rooms at service stations are sent to state health department headquarters at Topeka by tourists.

High Rest Room Standard Set By California Oil Companies

N. P. N. News Bureau

LOS ANGELES, March 19.—"Service stations operated on the Pacific Coast by major and large independent oil companies set a standard for rest room cleanliness that is not exceeded in many homes."

This was the compliment passed out by a California state health officer in discussing the importance of clean comfort stations, not only with respect to protection against venereal diseases, but also for the safeguarding of general public health.

Specific laws, routine inspections, or currently active programs designed to protect the motoring public from unclean toilets and accessory facilities at service stations do not exist on the West Coast, largely because the oil marketing companies long ago realized that filth or unsanitary conditions in the restrooms offered a sure way to turn the motorist customer elsewhere.

However, there are certain general laws in this territory which give the health authorities, whether state, county or city, the right to insist that all toilet facilities offered to the public be kept in a clean and sanitary condition.

Under Section 5 of the California Food Sanitation Act, any service station selling any product which might come under the classification of "food" would be subject to the following regulation:

"Every building, room, basement or cellar, occupied or used for the preparation, manufacture, packing, canning, sale or distribution of food, shall have convenient toilet or toilet rooms, separate and apart from the room or rooms where the process of production, manufacture, packing, canning, selling or distributing is conducted.

"The floor of such toilet rooms shall be of cement, tile laid in cement, wood, brick or other non-absorbent material, and shall be washed and scoured daily.

"Such toilets shall be furnished with separate ventilating pipes or flues, discharging into soil pipes, or on the outside of the building in which they are situated. Lavatories and washrooms shall be adjacent to toilet rooms, and shall be supplied with soap, running water and towels, and shall be maintained in a clean and sanitary condition."

Other public protection laws on the state books and affecting service station operation include the common towel and common drinking cup acts,

(*Continued on page* 20)

National Petroleum News

Copyright 1938 by The National Petroleum Publishing Co.
Trade Mark Registered U. S. Patent Office.

Published every Wednesday by The National Petroleum Publishing Co.

Warren C. Platt, *Editor and Publisher*
V. B. Guthrie, *Managing Editor*

FOUNDED 1909
Member of Audit Bureau of Circulation and Associated Business Papers, Inc.

Publication office: 1213 W. Third Street, Cleveland, O.
Telephone, CHerry 7672 Cable Address, Plattoil, Cleveland

NEWS BUREAUS

New York, 50 W. 50th Street, Telephone, COlumbus 5-1516 and 5-1517.
Chicago, Buckingham Bldg., 59 E. Van Buren Street, Telephone, Harrison 5901-2-3.
Washington, D. C., 1002 National Press Bldg., Telephone, NAtional 0654.
Tulsa, Okla., 904 World Bldg., Telephone, 3-7132.
Los Angeles, 610-A Hillstreet Bldg., 815 South Hill Street, Telephone, VAndike 2845.

Subscription rate $3 per year in United States and Mexico; $4 in Canada; $4.50 Foreign Countries. Current copies 10 cents; back copies more than two months old 20 cents per copy.

One Plank in a Platform For a Sounder Oil Industry

Broader tank car markets.

More refiners, including majors, selling in those markets and more jobbers buying in them also.

Both buyers and sellers **Daily** making completed sales for prompt shipment of unbranded products.

Government Control Threatens Through Social Security Rulings

By WARREN C. PLATT, Editor

About all that the new rulings by the Internal Revenue Bureau as to who is and who is not an "employe" under the Social Security Law decided was that an oil company has to hire still another expert to help it find a way through the increasing multitude of complex laws.

By those rulings it became obvious that industry is going to be up against the same kind of hair-splitting rulings and law as it has been on income tax and other matters. No ordinary lawyer can do a company any good, it will have to be an expert highly polished in each field of government regulation.

The oil industry should look upon these two rulings as only the beginning of what will undoubtedly be a long and tedious and complicated battle, fought first before Washington and state commissions—bureaucracies—and then, if the taxpayer survives, before the courts. The man who is an "employe" today may not be tomorrow when higher courts pass upon his status. These rulings are really on the extreme ends of the question.

In between is where the battle will be fought, with the labor unions undoubtedly doing all they can to broaden the term "employe" to the utmost and the companies trying to keep from being ensnarled in prohibitive "chain store" taxes, while the "employes" probably debate whether they want to contribute to a "social security" of whose actual security there may be some question.

For the full text of the rulings on employes at service stations see pages 16 and 17 of last week's NATIONAL PETROLEUM NEWS. These rulings undertook to state two extreme cases, presumably, where one operator's lease restricted him so to company supervision and direction that the Revenue Bureau held he is an employe and the other where the lease did not restrict the operator as much and he is not an employe. There are all sorts of interpretations possible in between these two.

It would seem to an ordinary layman that the clash comes when restrictions on property that is leased seem to govern more than the use of the property and are rules affecting somewhat the conduct of the individual leasing the station. Yet rules governing the *USE* of the property are necessarily, to a greater or less extent, rules governing the conduct of the individual leasing the property. From the reading of the two rulings just published it would seem to a layman that the government is already confused or else might seem to be tending to restrict the property owner's rights as to the uses of his property.

The government points out that, in the lease under which it holds the operator is an employe of the supplying company, that the lease forbids the operator from installing "any structures, improvements or equipment thereon." Aren't you so limited in any standard lease for any kind of property? You can't even drive a nail to "install" a picture that might be the greatest inspiration imaginable to your sales staff, under any standard office lease.

It would seem, to an ordinary mind, that a company having built a station for a certain purpose, to sell oil and gasoline and even to sell *ONLY* its own oil and gasoline, can lease that station to an operator to run it as he will as a principal so far as his *METHOD* of operation goes, so far as his personal conduct of the business is concerned. That is the company says nothing as to the price or the terms the operator sells the products at, how he greets the customers, when he opens and when he closes the station, how many people he hires or what he hires them to do. The company says nothing as to the personal conduct of the operator.

It also might seem to be possible that a company will say that, because of the rental it charges for the property, it must have guaranteed to it a certain volume of business and that as an aid to this guarantee the operator must keep the place clean, must wear a uniform, must give out advertising, all to the end of protecting the company's investment in the property. The property is only good for gasoline and oil selling. It cannot be used for a restaurant or blacksmith shop.

The operator is leasing it as a *GOING OIL AND GASOLINE BUSINESS,* not as a vacant lot nor a lot with a building on it. The company itself, or through a predecessor operator, has added to the lot and the building and the pumps and the rotary lift and all the equipment, something else and that is a volume of business; further a reputation as a decent and reliable place of business; a business which, through advertising, the uniform of the operator, the advertising and the brand of the products, tends to insure a certain volume on which both the owner of the property and the operator are absolutely dependent for the success of the contract between them.

It would seem that the oil company that owns the property and also owns the *GOING BUSINESS* that makes that property valuable for this particular lease, and which *BUSINESS* is the chief consideration in the lease, should be able to protect those two joint things, the property and the *BUSINESS,* and at the same time not be the employer of the other party to the contract and that operator's assistants.

This argument is not made to support one side or the other but to try and get a clear understanding of the facts on which the ultimate decisions will have to rest, unless this

country goes to a more personally directing type of government.

This might be a relatively simple problem were it not for the chain store taxes and the labor unions and their contention that station operators are employes of the supplying company.

Each state fixes its own definitions of what is a "chain store" but this definition can be and has been changed from one legislature to another. An "independent" store today by the next legislative session can become a "chain" store and subject to taxation as such. One might say that the definition is likely to be rewritten, if the present adherents of the chain store tax continue to control legislatures, to the point almost of taxing national brands. Undoubtedly the rulings on the Social Security Law will have much to do with any redrawing of the "chain store" tax definitions.

The labor union contention that all service station attendants are employes of the supplying company, is one of expediency on their part rather than law, but, as the labor unions stand so high at Washington these days, they can be counted on to continue their pressure on the authorities at Washington to so write their rulings as to give the unions support. In short the definition of when is a station attendant an "employe" of the supplying company, is going to be narrowed month after month by the co-operative pressure of labor unions, chain store tax advocates, their friendly legislatures, and the administrators of the social security law who naturally want more and more people under that law, until all four interests are agreed, and then where will the oil company be? And the question arises whether the company is a major or a small company. The definition of who is an "employe" will apply finally to all alike. All will then be under the daily direction of government bureaucracy.

The most powerful single driving force as to who will be determined to be an "employe" at a service station will be the labor unions. Their ultimate end may well be said to be that they want every person who helps to distribute a national brand of gasoline to be called an "employe" of the company owning the brand.

The National Labor Relations Board, in recognizing such a contention, is not bound by what the Social Security division of the Internal Revenue Bureau says but, if the bureau went the whole route on such a definition, then it is to be expected that the Labor Relations Board probably would accept it. However, the Labor Board could go there first which would give added leverage to changing the definition written by the Internal Revenue Bureau.

As time goes on, however, may not the states that need tax money, the Social Security administrators that want more people beholden to government, the labor unions that need more paying members and even the small merchants who don't want the chain stores to be too strong, get together on definitions that will be mutually satisfactory to those four interests and which, at the same time, will give each at least a substantial part of the spoils of politics?

Or perhaps the federal social security administrators and the beneficiaries, the station employes, along with the labor unions, may "gang up" on the chain store taxes to knock them out in order to invite a tightening of station supervision which could be called "company operation"?

In whatever has been said above, there is no thought of opposing "social progress," of which so much has been said by those in the Roosevelt administration. I have not heard any oil man express opposition to true social progress but the trouble is in which direction does it lie? How can it be achieved?

The great strength of this country, up to the present, was in the fact that every man was entitled to have and to express his own opinion and, if he differed with those in authority, he was still an American citizen in good standing.

So we have men who do not believe in the theory of old age pensions for all as against the further development of individual thrift. Also we have a vast number of people who are for a pension providing it can be worked out without ruining business and sinking the country. Certainly there is no unanimity among men who are entitled to have a real opinion, that the present social security law in any way lives up to its name, especially with the present administration "borrowing" the reserve funds for daily operating expenses, a practice that, if indulged in by any insurance company, would send its officers to jail at once.

Ginless Cocktails for the Economists

By WARREN C. PLATT, Editor

Quotations—not sales—have generally supplied the price in the thousands of contracts between major and semi-major refiners and their jobbers in the Midwest in a recent period of 20 days covered by *Platt's Oilgram*.

These were the quotations only of small refiners in Oklahoma, which is the "Group 3" price that is so generally accepted by the industry for contract purposes.

No large or major refiners even offered a quotation on gasoline for open spot market sale let alone sold a single car, so far as *Oilgram* could discover in that period.

Also in that period, but two small Oklahoma refiners told *Oilgram* that they had actually made any open spot market sales of gasoline. These two small refiners and one large one that occasionally has some stray cars of gasoline for sale, seem to be the only refiners, big or little, who contributed any sales to help create the open spot market price on gasoline.

These figures would indicate that not more than a score of jobbers, if that many, contributed toward that open spot market price by doing any buying whatever.

While much has been said the past few months about the big gasoline stocks, and economists have discussed quite learnedly their effect on "the market," the facts seem to be that these particular refiners of Oklahoma and other Mid-Continent tank car market centers, who sell or quote on the open spot market, have no excessive stocks of gasoline. In fact, if anything, their gasoline stocks, so far as one can gather this confidential information, are lower than past years because of the refiners cutting runs or shutting down entirely on account of their finding present tank car prices most unprofitable, so they all report.

It is rather hard to see, therefore, how the gasoline stocks in the tanks of the major companies only can have any direct effect whatever on this little Oklahoma, and other small spot tank car markets, unless the major companies should be offering special deals on special margins to the few remaining customers of this handful of Oklahoma refiners?

One great objection to the tons of statistical facts and figures that clutter up business today is that we are all mentally lazy. So many people are content to grab a few facts and then run off to an adding machine and fool with them according to preconceived ideas and without making any effort to find out what is actually behind the facts.

The gasoline statistics that are gathered by the American Petroleum Institute and the U. S. Bureau of Mines are of great value to the industry, if properly used. But as one reads them, one should bear in mind that hardly a drop of all those millions of barrels of gasoline is being offered on the "open spot tank car market of Group 3," or ever will be so offered, and right now that is the market that makes the so-called "market price."

In fact, if we threw a cocktail party and invited all the economists and other expert figurers who toy each month with gasoline statistics, and did not put in the cocktails any more gin than there is "open spot market Group 3 gasoline" in those imposing stock figures they study, we'd be mobbed. Not unless the figure hounds like ginless cocktails.

Refiners from Every Section On Tulsa Oil Expo Committee

N. P. N. News Bureau

TULSA, March 21.—Appointment of 44 members to his committee has been announced by C. M. Boggs, Arkansas City, Kans., chairman of the International Petroleum Exposition's Refining Committee. Mr. Boggs, who is president of the Kanotex Refining Co., and of the Western Petroleum Refiners Assn., has chosen his committee personnel from every refining section of the country.

In his instructions to the committee members who are given the duty of promoting attendance of members of the refining division at the Exposition in Tulsa, May 14 to 21, Mr. Boggs pointed out the fact that of the 600 firms already contracted for space at the show, 303 of them will devote all or a portion of their displays to the latest developments in refining.

In addition to these displays there are to be numerous new scientific and technical exhibits in the recently completed Hall of Science.

Exhibits included in the 10,000 pieces of equipment to be seen at the Show will include new devices for greater efficiency, higher recovery and safety in refining operations; the latest in polymerization and the cracking and reforming of butane and pentane molecules; vapor saving and vapor recovery devices and plant development; de-sulphating of natural gases to reduce hydrogen sulphide content; processing of lubricants, and machinery for all the latest refining processes.

Members of the Refinery Committee named by Boggs, were:

Gene Moriarity, Derby Oil Co., Wichita, Kans.; Ted Helling, El Dorado Refining Co., El Dorado, Kans.; C. L. Henderson, Vickers Petroleum Co., Wichita, Kans.; Francis Jehle, Globe Oil & Refining Co., Wichita, Kans.; Albert Finston, Bell Oil & Gas Co., Tulsa; Rex H. Winget, Cushing Refining Co., Cushing, Okla.; C. L. Marshall, Anderson Prichard Oil Co., Oklahoma City; Leo Snyder, Champlin Refining Co., Enid, Okla.; Tom Eason, Eason Oil Co., Enid, Okla.; Mark Kleeden, Black Gold Refining Co., Oklahoma City; T. C. Argue, Jr., Johnson Oil & Refining Co., Cleveland, Okla.; L. B. Simmons, Rock Island Refining Co., Duncan, Okla.; T. H. Riggin, Wilcox Oil & Gas Co., Tulsa; Roy B. Jones, Panhandle Refining Co., Wichita Falls, Texas; G. L. Waggoner, Waggoner Refining Co., Electra, Texas; W. D. Richardson, Cosden Refining Co., Ft. Worth; T. M. Martin, Lion Oil Refining Co., El Dorado, Ark.; P. O. Hardwick, Spartan Oil Corp., Shreveport, La.; H. H. Schwartz, Arro Refining Co., Lewiston, Mont.; Paul G. Blazer, Ashland Refining Co., Ashland, Ky.; H. M. Nichols, Atlantic Refining Co., Philadelphia; M. J. Welsh, Atlantic Refining Co., Port Arthur, Texas; E. R. Lederer, Bradford Oil & Refining Co., Bradford, Pa.; J. H. Wright, Bowling Green Refining Co., Bowling Green, Ky.; T. A. Telfer, Calumet Refining Co., Chicago; Chas. McLean, Canfield Oil Co., Cleveland, Ohio; B. C. McClellan, Chalmette Petroleum Corp., New Orleans, La.; W. D. Richardson, Cosden Oil Corp., Big Springs, Texas; W. Moody, Deep Rock Oil Corp., Tulsa; H. A. Logan, Elk Refining Co., Charleston, W. Va.; P. C. Scullin, Indian Refining Co., Lawrenceville, Ill.; R. S. MacMillan, MacMillan Petroleum Corp., Los Angeles; D. C. Frizell, MacMillan Petroleum Corp., Long Beach, Calif.; L. L. Rebber, MacMillan Petroleum Corp., Norphlet, Ark.; J. W. Newton, Magnolia Petroleum Co., Dallas; John Ricker, Magnolia Petroleum Co., Fort Worth, Texas; C. S. Dickens, Magnolia Petroleum Co., Corsicana, Texas; J. T. Dickens, Magnolia Petroleum Co., Luling, Texas; Jacob France, Mid-Continent Petroleum Corp., Tulsa; H. B. Setzler, National Refining Co., Coffeyville, Kans.; C. F. Arnold, National Refining Co., Findlay, Ohio; Fred Bergen, National Refining Co., Marietta, Ohio; John E. Shatford, Ouachita Valley Refining Co., El Dorado, Ark; C. W. Cahoon, Olney Oil & Refining Co., Wichita Falls, Texas.

Price Advance In Kansas

CHICAGO, March 22.—Monday, March 28, Standard Oil Co. of Indiana will advance to within one cent of normal all tank wagon prices to consumers on Stanolind (third-grade) gasoline and kerosine, and to within one-half cent of normal all subnormal prices on Standard tractor fuel throughout Kansas, where such prices now are subnormal more than the indicated amounts, it anounced today.

"It is hoped this action will result in an improvement in marketing conditions in Kansas", company stated.

Major Oil Companies Back Railroads At 6.6 Hearing

(*Continued from page 9*)

ness who presented an exhibit showing that a 28.7-cent per hundred pound rate on an estimated 6 pounds per gallon would yield about the same revenue as 26-cent rate on a basis of 6.6 pounds.

Averaged 5.9 Pounds

The exhibit included data on some Anderson-Prichard shipments for last year. Average gasoline weight was given as 5.925 pounds per gallon at 60F, and natural gasoline shipments received at Colorado, Texas, as 5.402 pounds per gallon.

A statement was included of data from five Mid-Continent refiners showing that excess revenue to railroads on 4396 tank cars of gasoline during January and July, 1936, was $15.41.

Exhibit 2, introduced by Champion, was a comparison of weights obtained by railroad scales against weights determined by specific gravity on shipments of road oil and asphalt, gas oil, tractor fuel and gasoline in Oct., 1937, from Colorado, Texas.

N. T. Wiedemann, of Minneapolis, president of Tankar Gas, introduced Exhibit 3, a record of the company's gasoline shipments at various midwestern marketing points since 1936.

The compilation was for 650 tank cars, showing an average weight of 5.9 pounds per gallon.

"As far as we are concerned we prefer to pay the actual weight on each car," Wiedemann testified, determined either by gravity or scale weight. To a question by Disque, he testified he would favor a 5.9 pounds per gallon as an estimated weight.

J. Krawatz, of Chicago, the Phoenix Chemical Laboratory, was the final first day witness. Krawatz went into the chemistry of petroleum, and especially into gravity and the defining of weight.

Highlight of Krawatz's testimony was a demonstration of determining the weight of a gallon of gasoline by a hydrometer reading and by actual scale weight. The hydrometer reading showed that a sample bought at random in Chicago's Loop, of 61.6 gravity, was 6.1 pounds. The scale weighing showed the gasoline to weigh slightly over 6 pounds.

Exhibit 4 was introduced, taken from the log of gasoline samples tested at the Phoenix laboratories.

Examinations were conducted by Stanley Houck, attorney for Tankar Gas, and J. F. Lawrence, of Tulsa, representing refinery rail shippers in the Mid-Continent. Most of the cross-examination was conducted by R. C. Fyffe, attorney of record for the defendant railroads.

Appearances Filed

The 6.6 case hearing opened March 21 with ICC Examiner Disque calling for appearances.

All complainants were represented, the Tankar Gas, Inc., of Minneapolis, Indiana Independent Petroleum Assn., Illinois Petroleum Marketers Assn., the Wisconsin Petroleum Assn., Home Oil & Gas Co., of Great Falls, Montana, Anderson-Prichard Oil Co., Producers' Oil Co., Dayton, Ohio, and the Feldman Petroleum Co., of Chicago.

Appearances by intervenors resulted in declarations of position in the complaints in which they were interested. Major companies, heavily interested in marine or pipeline transportation of gasoline, arrayed themselves with the defendant railroads against a reduction in estimated weights.

These included the Standard Oil Co. of Indiana; the Standard Oil Co. of Nebraska; Socony-Vacuum Oil Co. including Wadhams Oil Co., Perfect Oil Co., and Magnolia Petroleum Co.; Skelly Oil Co.; Mid-Continent Petroleum Corp.; The Texas Co. and Indian Refining Co.; Gulf Refining Co. and Gulf Oil Co.; Cities Service Oil Co. of Delaware; Shell Petroleum Corp.; Continental Oil Co.; Phillips Petroleum Co.; and Tidewater Associated Oil Co.

Pure Oil Co. straddled the fence. Pure's position was announced as interested in any reparations, believing the 6.6 estimated weight as acceptable as any, and interested in cases where its interests were involved. Arkansas Fuel Oil Co. announced it was not declaring a position.

Intervenors supporting the complaints against the estimated weights were the Iowa Independent Oil Men's Assn.; the South Dakota Independent Oil Men's Assn.; Northwest Petroleum Assn.; Kanotex Refining Co.; Lion Oil Refining Co.; Cosden Oil Co.; and L. L. Coryell & Son.

Disque then called for ap-

pearances of those now intervening. These included, supporting complaints, the Globe Oil & Refining Co. and others; Illinois Oil Co. and others; Consumers Co-Operative Assn.; Larkin Co. of Illinois; Independent Refining Co. and Yale Oil Co.; Illinois Agricultural Society and the Illinois Farm Supply Co.

Majors Opposed to Change

Those opposing were the Standard Oil Co. of Louisiana; the Standard Oil Co. of New Jersey; Shell Union Oil Corp.; and the Atlantic Refining Co.

Sinclair Refining Co. appeared with no definite position. The Western Pennsylvania Refiners Traffic Assn. entered a fence-straddling appearance, reporting being interested in reparations without a definite position.

Counsel for Tankar Gas then entered a statement. The petition was amended to strike the statement about gasoline weight being 5.7 pounds per gallon and to substitute a phrase that weight "is substantially less than 6.6 pounds per gallon."

Besides removing the 5.7 pounds limitation the statement related that other cases will abide by the decision in the Tankar complaint, that evidence in the Tankar case will be restricted to gasoline and kerosine, that rates were not being challenged, and that the complainant did not demand adherence to track weights, but if actual weight was not to be used, then the weights of various grades of gasoline and kerosine should not be averaged.

No Evidence on Reparations

Disque announced there would be no evidence in respect to reparation allocations. Then the first witness was called, M. H. Champion, a director and traffic manager of Anderson-Prichard.

Champion testified that the weight of gasoline can be determined without scale weights, through the gravity of the gasoline, and that the gravity is listed on all invoices. As for checking the weight, he testified railroads could inspect the cars enroute. He pointed out that road oil and asphalt rates are being determined now by actual weight.

If the estimated weight of gasoline was reduced to 6 pounds would Champion be willing to have the estimated weight on other products raised, Disque asked. Champion replied he wanted actual weights, but if estimated weights were to be used he wanted the estimates to approximate actual weights.

Champion introduced Exhibit 1, showing origin of the API scale, relation of API degrees and specific gravity, percentage and gallonage yields from a barrel of crude from 1880 to 1936, and a history from 1913 to the present of Group 3 rates to 18 points in the western trunk line territory.

Second Day's Testimony

On the second day 12 witnesses took the stand and closed the case for the supporters of the complaints.

Nathan R. Feldman, of Chicago, the Feldman Petroleum Co., one of the complainants and the first witness March 22, testified that the average weight of gasoline received during the past four years was 5.942 pounds.

Next witness was G. A. Primm, of Springfield, Ill., secretary of the Illinois Petroleum Marketers Association, also a complainant. Primm said a statement had been prepared, but to avoid repetition in the record, "We will accept the data offered by Mr. Champion."

H. J. Hlavka, of Rockford, Smith Oil and Refining Co., entered testimony on scale weights of two groups of gasoline tank cars. In September 1936, nine cars showed an average actual weight of 5.971 pounds, while in March, 1938, nine cars showed an actual average weight of 5.875 pounds, Hlavka said.

Russell S. Williams, of Indianapolis, Gaseteria and the Bonded System, testified gasoline gravity of his company's gasoline was 60-61.

Five exhibits then were introduced by George M. Cummins, of Davenport, the Davenport Traffic Bureau, showing gasoline inshipments by Iowa oil jobbers, who were intervenors in the case. One of these exhibits showed that on 54 gasoline tank cars the actual track scale weight was 6.013 pounds per gallon.

L. C. Jones, of Great Falls, Montana, traffic expert representing the Home Oil and Refining Co., and others, complainants, next testified, adopting exhibit introduced by Champion.

G. W. Baxter, of Chicago, traffic director of the Illinois Agricultural Society, following, testified that the Illinois Farm Bureau shipments were similar in gravity to those of the Indiana Farm Bureau.

For Montana Refiners

Representing two Montana refiners, D. C. Stone, of Denver, said gasoline shipped last year by the Independent Refining Co. averaged 5.952 pounds while shipments by Yale Oil Corp. ranged from 5.96 to 6.22 pounds.

An exhibit on 25 gasoline tank cars shipped by Kanotex Refining Co. in 1937 was introduced by C. E. Varner, of Arkansas City, traffic manager.

P. G. Anderson, of Eldorado, Lion Oil Refining Co., traffic manager, testified to accepting data submitted by Champion, Final witness for complainants was H. G. Watts, of Wichita, traffic manager of Derby Oil Co.

Defendants placed three witnesses on the stand, taking up the case late in the afternoon.

Origin of 6.6 Figure

W. E. Prendergast, of Chicago, of the Western Classification Lines, presented a statement tracing the origin of the 6.6 pounds weight basis, to a meeting of the carriers and the oil industry, July 12, 1909, when, he said, an investigation showed that 6.6 pounds was more representative of average weight of petroleum products than the 6.4 pounds.

Prendergast stated estimated weights came into effect Jan. 1, 1893, in Western Classification territory, to speed shipments, obviate scaling cars and simplify billing. Before 1903 all products moved at 6.4 pounds per gallon.

J. Iran Harris, of Indianapolis, representing the Indiana Farm Bureau, introduced a compilation of shipments showing freight charges paid, gravities, and gallonage for shipments received in the final day of each month in 1937.

Texas Decision May Encourage More Drilling

N. P. N. News Bureau

TULSA, March 21. — Two important interpretations of the well spacing law in Texas, generally known as Rule 37, were given last week by the Third Court of Civil Appeals at Austin.

In one of the cases the Shell Petroleum Corp. had sued to cancel a Texas Railroad Commission permit to drill on a tract of 0.53 acre partitioned from an original tract of 68.5 acres located in Gregg county. The other case was styled L. P. & B. Oil Corp. vs. Gulf Oil Corp. et al.

The Court held in the Shell case that the rule against voluntary subdivision of property capable of development as a whole would not apply where the subdivision was made in territory which had not been proved as productive. The importance of the Court's ruling, it was pointed out, was because of the uncertainty in the minds of many attorneys as to whether the rule against voluntary subdivisions extended from the time when the rule originally was written in 1919. The Court specifically declared, however, that the Legislature had prohibited the Railroad Commission from, in any way, limiting the drilling of oil wells in wildcat territory; hence Rule 37 could not apply in any field until the discovery of oil, therefore the partition by which the half acre was caused fell within the prohibition set up by the courts.

The Court's interpretation, it was believed in some quarters, will pave the way to a more intensive drilling in some areas.

In the L. P. & B. Oil Corp. vs. Gulf Oil Corp. et al case, the court held that no injunctive relief against a law or the commission's rules can be had without notice to the commission in order that it be given an opportunity to be heard. The case was an appeal from a court order enjoining the L. P. & B. Corp. from drilling a second well on a 2-acre tract in Gregg county under a commission exception to Rule 37.

Attorney General William McCraw said the decision in the Shell case was a victory for farmers and small landowners. "We are highly pleased," he was quoted as saying, "as the decision gives sanction to our opinion, that every individual owner of a small tract has a right to its proper development."

South Dakota Jobbers Enter 6.6 Case

N. P. N. News Bureau

WASHINGTON, March 21.— New intervenors in the "weight of gasoline" cases, hearings on which were scheduled to start today in Chicago, continued to come into the picture during the last few days before the hearings, all seemingly intent in settling whether the 6.6 pounds per gallon estimated weight upon which railroads base freight charges for petroleum products is reasonable.

A fifth statewide jobbers' association was given permission of the Interstate Commerce Commission to intervene. The South Dakota Independent Oil Men's Assn., whose petition asked to take part in three of the docketed cases. Other intervenors included refiners and individual marketers.

Three jobbers' associations are complainants in as many cases, and a fourth had come in as an intervenor previously.

Rest Rooms At High Standard On West Coast

(*Continued from page* 15)

which are considered to apply to service stations. City and county laws back up these more general state laws and are more specific as to their requirements.

Local Jurisdiction

Los Angeles county health officers enforce state laws on general health and also enforce the state housing act in incorporated towns within the county which are not equipped with health departments. The health department of this county has a contract with 37 cities in the area to do their health department work. Thus service station toilets come under the jurisdiction of these officers.

At the present time, the Los Angeles county health department has under consideration a specific law which would prohibit the maintenance by any person of unsanitary or offensive conditions at restrooms offered to the public. It is understood this is designed to clean up facilities found in restrooms at some service stations and garages.

California state health authorities have printed seven pamphlets for free distribution in the campaign against venereal diseases. These are given away at county and state fairs, through service clubs, parent teacher associations, schools, and are designed to aid the public in combating diseases and leading normal and healthy lives.

A porcelain enamel sign has been developed by the state board of health for use in restrooms as a means of keeping the subject of venereal diseases before the public in a conspicuous yet modest way. California oil marketing companies will be asked to co-operate in the campaign by displaying these signs in restroom facilities. They warn against self treatment of social diseases and call attention to the free literature on the subject.

Students Take Tests

MADISON, Wis., March 21.—Four students at the University of Wisconsin showed positive reactions to blood tests for syphilis out of 4000 students tested, according to Dr. William F. Lorenz, director of the psychiatric institute at the Wisconsin General Hospital, on the university campus.

This relatively low percentage of one-tenth of one per cent, or one in 1000, was revealed after a drive by the "Daily Cardinal," campus publication, to have students voluntarily take blood tests.

The number of positive reactions to blood tests of persons throughout Wisconsin has been about 2 per cent of the total. The U. S. Public Health Service estimates one in every ten contracts syphilis in the adult population at large.

Virginia To Inspect Station Toilets

By Telegraph

RICHMOND, Va., March 21.—The Virginia legislature which has just closed its session took cognizance of the need for cleanliness in filling station rest rooms, and passed a law empowering county health officers to inspect them.

The new law has the effect of including rest rooms of filling stations and tourist camps in with those of hotels and other public places which the county health officers already were empowered to inspect. No fees are involved.

Richmond and various cities throughout Virginia already have laws under which periodic inspections are made of service station toilets as well as those of other buildings under the sanitary regulations. All of these give the city health officer wide discretion in determining a "clean and wholesome" condition.

Don't Post Quack Cures, Stations Urged

N. P. N. News Bureau

CHICAGO, March 21.—A suggestion for petroleum industry co-operation in the campaign for control of venereal disease was made to NATIONAL PETROLEUM NEWS by Dr. Louis D. Smith, of Chicago, chairman of the Chicago Medical Society venereal disease commission.

The suggestion is for service stations to prohibit posting, and to remove any postings done secretly, of quack venereal disease advertisements in their toilets. Dr. Smith explained that such advertising encourages self medication for those diseases.

He also advised against the distribution of unauthorized literature on social diseases.

Worker's Standard Raised By Clean Factory Toilets

N. P. N. News Bureau

CLEVELAND, March 21. — Men and women of the industrial working classes, whom a filling station attendant might think are not so particular about toilets and restrooms, actually have had more education in public sanitation than any other class of workers, in many cases.

Cleveland, for example, is typical of a score or more large industrial cities. Cleveland factories are not only subject to an army of men and women sanitation inspectors of the Industrial Relations Department, Industrial Commission of Ohio, but are also governed by cleanliness standards set by the Cleveland Safety Council, local organization of the National Safety Council.

The Cleveland Safety Council enjoys the membership of nearly all the major plants in the city. Here are the standards for toilet cleanliness which the council sets forth for its members:

1. Floors of toilet rooms should be tight, smooth, and constructed of a substance impervious to moisture. Floor drains should be installed.

2. Walls and partitions of toilet rooms should be of such materials as to permit washing down with a hose stream.

3. Adequate window area opening out-of-doors and ventilating flues hooded over the various fixtures. (Pipe size for varying sized fixtures follow in detail.)

4. Water closets should be of the individual bowl type with individual water seal and should be made of white vitreous china or porcelain and not of enameled iron. The seat of each water closet should be . . . impervious to water. Seats made of enameled iron ware, porcelain or other heat absorbing material should not be used.

5. Each closet should be enclosed in a stall provided with a door. Stalls should be at least 30 inches in width and distance from front of seat to door should not be less than 30 inches. Partitions should be of steel construction, painted or enameled, 6 feet in height and 6 to 12 inches off the floor. Each stall should be equipped with a coat hook and a toilet paper fixture.

6. Urinals should be in a suitable enclosure, the individual stall type being now considered best, preferably made of porcelain.

The standards set forth in further detail types and sizes of fixtures that should be used. Even fuller sets of regulations govern factory drinking water, wash room and locker room facilities and have been carried out to the extent of spending thousands of dollars in new equipment by plant managers here, who are desirous of minimizing loss of working time because of employes possibly contracting some infection through unclean toilets.

The factory facilities of the worker are frequently equipped with individual closets with doors; individual wash bowls equipped with foot pedal water faucets, cloth towels, metal full-length lockers, and private shower baths with cloth curtains.

Floors are almost invariably of concrete, with floor drains, and walls of tile and painted brick. Naturally some of the large companies have purchased more elaborate equipment than can always be afforded by the service station owner. However, as factories have made these improvements, the worker's standards for cleanliness of any toilet or washroom he uses have likewise obviously been raised.

Henry J. Stolz Dies At Milwaukee

MILWAUKEE, March 21. — Henry J. Stolz, 66, of Milwaukee, vice-president of Wadhams Oil Co. and an oil marketer for nearly 30 years, died here March 16, following a year's illness.

After leaving the Milwaukee public schools in 1891 he worked in the passenger and fregiht departments of various railroads and steamship lines until he joined the Bartles Oil Co. in 1909 in St. Paul. A year later he returned to Milwaukee as general manager of the Bartles-Maguire Oil Co. organized in 1910.

When Bartles-Maguire merged with Wadhams in 1929 he was elected a director and vice-president of the consolidated company.

Surviving are a son, John, a student at the Milwaukee University School; a brother, Anton, of Milwaukee; and two sisters, Mrs. Ida Quentin, of Milwaukee, and Mrs. Theresa Utz, of Appleton. Funeral services were held in Milwaukee, March 19.

Rising Output Fills Storage In California

N. P. N. News Bureau

LOS ANGELES, March 19.—Rising crude oil production, threat of curtailed offshore shipments, and weakened gasoline markets combined last week to bring home to the California oil industry the serious threat to continued stability.

Leaders were outspoken in expressing their belief that lower prices for crude oil and refined products were to be expected within the next week or ten days, unless some immediate and effective means for curbing booming production was found before storage facilities reached the breaking point.

Crude oil production, reported to voluntary curtailment authorities March 15, showed an all-time high for the past eight years when fields in the state produced 768,693 barrels. This is almost 80,000 barrels above the state quota and more than 120,000 barrels above actual allocation to producing wells.

Completion of 11 large wells in the Wilmington field since March 10 did much to turn the production curve upward and to undo some 50,000 barrels a day of curtailment on the part of large operators. This field's output was 127,079 barrels on March 15.

Faced with the possibility that purchasing companies would curtail their takings at this rate of production, oil producers in the Long Beach section of the Wilmington field voted March 17 to reduce maximum yield from wells in the area to one-half the rate of flow allowed under a voluntary arrangement made several weeks ago—during another crisis.

Effective 7 a.m. March 18, all wells bottomed in the gusher-yielding Terminal zone and which had been on production for a week or more were voluntarily pinched back to 1000 barrels daily, instead of 2000 barrels under the previous arrangement.

Furthermore, wells completed from here on—there is a large group of wells nearing the pay sand in the Long Beach harbor area—will be held down to 2500 barrels daily for the first week after completion and then be cut back to the 1000-barrel rate.

Last week some 19 wells in the harbor area of the Wilmington play were producing approximately 60,000 barrels a day—12 were allowed 2000 barrels each and 7, recently completed, were allowed 5000 barrels apiece.

Under the promised curtailment, production from the 12 settled wells will be reduced 12,000 barrels and from the 7 new projects 17,500 barrels, for a total of about 29,500 barrels daily. By next week the 19 wells should not be producing in excess of 19,000 barrels daily, but this will be added to by another 10 completions expected before April 1, it was expected.

Mexico-Japan Deal

Another disturbing factor in this situation was a report that arrangements had been made between Mexico and Japan for shipment of 100,000 barrels of oil from Tampico on March 22. Indications were this was for use of the Japanese government.

Far East takings, mostly by Japan, of California petroleum products have averaged 80,000 to 90,000 barrels a day in recent months. If this outlet or safety gauge to the California production situation should be plugged by a flow of Mexican oil across the Pacific, the West Coast situation would change for the worse overnight.

Spurred on by these darkening clouds, the voluntary committee of independent California producers and refiners pushed the state-wide poll of opinion on a proposed state oil control bill. It was too late to be placed before the recent special session of legislators, but if the industry can be lined up 90 per cent strong behind such a measure, the committee wil ask the Governor to call another special session on the subject.

Late in the week the committee reported 183 independent producers and refiners had indicated their stand on the question and that out of this number only seven were opposed to legislative control of the oil industry through the proposed bill.

Among producers supporting the measure were independent operators with 225,000 barrels of daily producing capacity, the committee said.

In this connection, a breakdown of production by major and independent producers for December 1937—700,307 barrels a day—showed the following: Seven major companies with a production of 380,595 barrels; all other companies 308,182 barrels daily.

East Texas Production Highest Since 1933

N. P. N. News Bureau

TULSA, March 21.—The East Texas oil field has again gone over the half million barrels daily production mark, the daily production on March 15 reaching 500,072 barrels. The production was from 24,720 wells, and the total was the highest the field has produced under proration laws since September 1933.

Propose New Name For British Oil Society

CLEVELAND — A proposal to change the name of the Institution of Petroleum Technologists, leading British society of the industry, to the Institute of Petroleum has been circulated to members. Most important modifications proposed in the articles and by-laws is the reclassification of membership to recognize and make available membership to those concerned with the study of petroleum in other ways than was originally conceived at the founding of the Institution in 1913.

Main objects of organization 25 years ago were expressed by the founder-president Sir Boverton Redwood, as being "the establishment of a hallmark of proficiency in their profession, and of a register of qualified members to be consulted by those financing and carrying out petroleum enterprises."

At present about 98 per cent of the members are associated with oil companies or closely allied industries and the term technologist is not broad enough, it is believed. While the intention is to preserve the professional status of the fully qualified technologist, it is believed that the proposed change will improve and strengthen the organization and will enable it to perform more efficiently its duties and responsibilities.

Egloff Lectures

CHICAGO, March 21.—Three lectures by Dr. Gustav Egloff, Director of Research for Universal Oil Products Co., were scheduled for this week before local sections of the American Chemical Society.

These lectures and the sections before which they will be given are: "Modern Cracking Processes", Rochester, N. Y., March 21, at University of Rochester; "Synthetic Products From Petroleum", Buffalo, N. Y., March 22, at University of Buffalo; and "Synthetic Products From Petroleum", Ithaca, N. Y., March 23, at Cornell University.

Turner Valley Competitor Of Mid-Continent?

TORONTO, March 19. — Arrangements for utilization of additional production of Turner Valley crude are going forward rapidly, advices received here indicate. One recent step is the acquisition by purchase by Anglo-Canadian Holding and Development Co. Ltd. of a controlling interest in Central Refiners, Ltd., of Calgary, Alberta. This company's plant at Brandon, Manitoba, will have an initial crude capacity of 1000 barrels per day, which will be expanded eventually to 3500 barrels per day according to present plans.

Anglo-Canadian is a Turner Valley development organization, and the Brandon plant will serve as an outlet for the crude produced by this and associated companies, it was stated.

Meanwhile, Royalite Oil Co., subsidiary of Imperial Oil, Ltd., is building a 6-inch pipeline from Turner Valley to Calgary, which will bring the total pipeline capacity there up from 13,000 barrels to 22,000 barrels per day, advices state. The crude requirements of the Prairie Provinces is estimated at 17,000 barrels per day of which 14,000 barrels will be supplied from Turner Valley.

Serious consideration is being given to the use of Turner Valley crude in Imperial's Sarnia Ontario refinery, now supplied with Mid-Continent crude. The higher quality of Turner Valley crude credits it with a premium value of 20 to 25 cents per barrel over Mid-Continent crude, some technologists say.

Alberta production of crude was up sharply in January, 1937 as compared to that of a year ago. January's production amounted to 444,196 barrels, as against 125,714 barrels a year ago. The value of 1937 production was estimated at $4,913,960, while the 1936 evaluation was $2,915,442, Canadian statistics show.

At this rate an appreciable amount of Mid-Continent crude consumption in Canada may be replaced by local crude, with a corresponding effect on demand for U. S. crude, it was pointed out.

April Gasoline Demand To Show Gain Over '37

N. P. N. News Bureau

WASHINGTON, March 21.—Domestic demand for motor fuel in April will total 44,500,000 barrels, an increase of 2.5 per cent over the actual demand for April last year, according to the Bureau of Mines.

Besides domestic demand, motor fuel exports will total 3,300,000 barrels in April, the forecast estimated.

Adjusting for benzol and "direct" sales and losses of natural gasoline, it was estimated that April required production of gasoline would be 44,400,000 barrels, which was distributed among the refining districts, as follows:

District	Barrels
East Coast	6,420,000
Appalachian	1,520,000
Indiana-Illinois	7,630,000
Oklahoma	2,630,000
Kansas	2,390,000
Inland Texas	3,430,000
Texas Gulf	10,550,000
Louisiana Gulf	1,380,000
N. La.-Arkansas	910,000
Rocky Mountain	1,110,000
California	6,450,000
Total U. S.	44,400,000

Daily average market demand for crude in April was figured at 3,361,700 barrels, which is 29,900 barrels less than the March estimate and 137,600 barrels (4 per cent) less than the actual daily production for April, 1937, but 2 per cent higher than the demand for domestic crude for that month, the Bureau pointed out.

The comparatively low estimate for April this year, it was explained, reflects the current recession as well as "the probability that excessive stocks will be reduced by curtailing crude runs to stills."

Unless reductions in gasoline stocks are accomplished in the latter part of March, the industry stands to enter April with stocks well above 93,000,000 barrels, the Bureau predicted.

"Crude runs figures of the American Petroleum Institute show declines in recent weeks," the Bureau of Mines report continued. "Part of these declines was due to plants closing down because of unsatisfactory market conditions, but a desire on the part of the others to reduce runs to improve inventories is also evident.

Stocks Decrease in April

"In April the factors tending to curtail runs will probably offset the seasonal increase," the Bureau added. "The estimated decline in gasoline stocks for April of 2,500,000 barrels, while high compared with past years, is therefore based largely on the assumption that crude runs will not greatly exceed 3,150,000 barrels, the average of recent weeks."

Natural gasoline consumption at refineries in April was estimated at 6.0 per cent of the total required, or 2,670,000 barrels. The yield of straight-run and cracked gasoline was put at 44.205 per cent for April, compared with 43.325 per cent for March.

Runs of foreign crude in April were estimated at 2,100,000 barrels. Crude exports were figured at 6,050,000 barrels, although the reservation was made that "recent developments in Europe may tend to increase exports of crude." Fuel and losses of crude were put at 2,500,000 barrels.

Estimated crude requirements by states for April, with comparative estimates for March, as calculated by the Bureau of Mines, were:

Daily averages in barrels)

State	April	March
Texas	1,329,800	1,344,900
California	698,700	694,600
Oklahoma	526,500	547,700
Louisiana	239,800	239,400
Kansas	173,000	176,700
New Mexico	106,000	105,100
Michigan	51,400	51,600
Pennsylvania	50,300	49,700
Wyoming	46,600	46,400
Arkansas	40,000	38,200
Illinois	34,700	30,700
New York	13,700	13,800
Kentucky	13,400	13,900
Montana	12,700	13,300
West Virginia	9,500	9,700
Ohio	8,800	9,100
Colorado	4,600	4,500
Indiana	2,200	2,300
TOTAL U. S.	3,361,700	3,391,600

Technical Papers For W.P.R.A. Listed

N. P. N. News Bureau

TULSA, March 21. — The technical program for the 26th annual convention of the Western Petroleum Refiners Assn. has been completed, Secretary A. V. Bourque has announced. The convention will be held at Hot Springs, Ark., April 25, 26 and 27.

In addition to the three papers already announced, a fourth paper on water treating will be given by L. B. Betz, chemical engineer of Philadelphia. The paper will deal particularly with treating of cooling water to prevent scale, corrosion and organic growths.

The three papers previously announced (See, N. P. N., March 9, page 20) include discussions of True Vapor Phase, the Howard Process for treating gasoline and the Pawhuska Road Tests conducted last summer to determine efficiency rating of fuel systems of various makes of automobiles.

DAILY AVERAGE PRODUCTION IMPORTANT DISTRICTS

American Petroleum Inst. Figures

	Week Ended Mar. 19 Barrels	Mar. 12 Barrels
Oklahoma City	125,100	129,150
Total Okla....	519,000	526,100
East Texas....	428,450	427,750
Total Texas...	1,312,850	1,290,500
Rodessa	41,900	42,350
Total La.	260,400	255,800
California	753,500	727,700
E. of Rockies..	2,680,050	2,654,400
Total U. S....	3,433,550	3,382,100
Crude imports.	75,850	110,570
Tot. new sup'ly	3,519,400	3,492,670

East Texas Oil Men Arraigned

TYLER, Tex., March 21.—Ten more of the 25 oil men charged in a federal grand jury indictment returned here recently with conspiracy to defraud by violations of state oil allowable regulations and making false affidavits to the federal tender board, have been arraigned and placed under bond. All told, 19 of the 25 had made bond by March 19.

D. W. Johnson and J. Wiley Stone were released on bonds of $2000 each. Johnson's purported statements to the tender board were allegedly made in the name of the Frontenac Pipe Line Co., for which he was field superintendent. Stone's statements were reported in the name of Lee and Burnett Co., and involved tenders to the Gilliland Pipe Line Co., it was charged.

Others who recently have been arraigned include J. G. Gilliland, Ralph G. Trippett and A. H. Meadows, each released on $10,000 bond; Fred A. Williams, J. O. Radcliffe, J. F. Shepperd, E. P. Williams and Vance Powell, each released on $1000 bond.

W. A. Dunigan Dies

N. P. N. News Bureau

TULSA, March 21.—W. A. Dunigan, aged 51, former president of the National Tank Seal Co., died at his home here March 16. He was born in Bradford, Pa., and came to Tulsa in 1913. He was an independent producer until 1917, when he enlisted in the army as the first Tulsan to join after war was declared. He served in the Rainbow division. Later he discovered the Terlton field and in 1926 sold his production and became president of the National company.

'Early' Depletion Of Oil Reserves Called 'Bugaboo'

N. P. N. News Bureau

NEW ORLEANS, La., March 19.—There was virtually no wringing of hands at the annual convention of the American Association of Petroleum Geologists here over the prospect of an immediate exhaustion of the nation's petroleum reserves.

Judged by the talks and the prepared papers and the discussions given at the three-day convention, the din that has been raised in some quarters over crude oil reserves being virtually on the fringe of depletion is actually little more than a hollow noise.

O. L. Brace of Houston, Tex., highlighting developments in 1937 along the Gulf coasts of Texas and Louisiana, said that section had its most successful year, "both from the standpoint of number of new fields and in the apparent total of reserves represented by these discoveries."

"The 29 new productive areas," Brace said, "are about equally divided between the two states, but it is probable that Louisiana can claim considerably more than half the reserves represented."

Then along came Dr. Alexander Deussen of Houston who said that eight times as much oil is still underground as has been taken from the area since the discovery of the famous Spindletop field in Texas and the Jennings field in Louisiana. He said Louisiana-Texas coastal production so far was 1,412,000,000 barrels, estimated known reserves 2,798,300,000 barrels, and oil awaiting discovery 9,000,000,000 barrels.

H. K. Shearer of Shreveport, reporting on the north Louisiana and Arkansas areas, said 411 oil wells and 175 gas wells were completed in north Louisiana in 1937. Production was 28,668,070 barrels, an increase over 1936 of 1,896,925 barrels. He also said that southern Arkansas had an increase in production for 1937 of 1,532,655 barrels, the first increase since 1925.

Southeastern New Mexico had 598 oil and 20 gas wells last year, while west Texas had 2380 oil and 8 gas wells, Hal B. Bybee and Berte R. Haigh of Austin, Tex., reported. This represented

a 60 per cent increase in development, they said.

Edward A. Koester of Wichita, Kans., reported that 69 new pools and new producing horizons in old pools had been discovered in Kansas in 1937. Edwin R. Hunt of Denver, Colo., reported that the Rocky mountain area had experienced moderate activity but not as much as in some years past.

Col. Ernest O. Thompson of the Texas Railroad Commission, principal speaker at the opening session said, "Let's run these alarmists who are raising this bugaboo of a petroleum shortage in a hole. The facts will do it. Our problem is not a shortage of oil but finding a market for what we now have.

"Because of a general misconception of the nature of the industry's oil reserves, fears of an impending shortage of petroleum have periodically cropped up in the headlines.

"Practically all published estimates of crude reserves have met with this reaction. There seems to be a feeling that when the crude reserve in sight at any particular date is used up, then the supply will have vanished altogether. That view, of course, is absolutely unfounded. If it were true, we should have been back in the horse and buggy days long ago."

A considerable amount of the convention time was given over to a discussion of the technical phases of the work of the geologists and of the members of the Society of Exploration Geophysicists, who met at the same time in annual convention.

The association members, holding their election March 16, chose Donald C. Barton of the Humble Oil & Refining Co.'s research division, Houston, Tex., as president. Other officers elected were:

Harold Hoots, chief geologist for Richfield Oil Corp., Los Angeles, vice president; Ira H. Cram, Pure Oil Co., Tulsa, secretary-treasurer, and Walter A. Ver Wiebe, University of Wichita, editor.

Lube Plant Shut Down In West Tulsa

N. P. N. News Bureau

TULSA, March 21.—For the first time in 16 years the lubricating oils plant at the Mid-Continent Petroleum Corp.'s refinery in West Tulsa has been closed down completely. The shut down will continue for at least 30 days.

Officials of the corporation said that the relatively low prices prevailing at present for neutral oils and bright stocks, coupled with excessive stocks in both the Mid-Continent and Pennsylvania fields, was responsible for the shutting down of the plant.

Thus one of the largest lubricating oils plants in the Mid-Continent refining district joins the ranks of at least five other large refiners in Oklahoma who have either curtailed neutrals and bright stock production drastically or have shut down their plants completely until they have had an opportunity to work off excessive stocks.

The statistical situation

BRIGHT STOCKS

Month	Prod.	Ship.	Stocks
June	180,596	194,555	277,118
July	155,101	163,496	268,723
Aug.	139,325	143,891	264,157
Sept.	162,954	176,545	250,566
Oct.	163,688	137,830	276,424
Nov.	161,159	133,212	304,371
Dec.	178,895	72,256	411,010
Jan.	154,769	123,737	442,042

NEUTRAL OILS

Month	Prod.	Ship.	Stocks
June	170,536	196,253	202,603
July	171,127	164,724	209,006
Aug.	177,102	167,498	177,102
Sept.	151,892	168,140	202,362
Oct.	177,887	176,680	203,569
Nov.	180,033	160,084	223,518
Dec.	150,428	119,899	254,047
Jan.	124,812	121,067	257,792

Increase In 'Gas' Stocks Slowed Down, Gas Oil Up

N. P. N. News Bureau

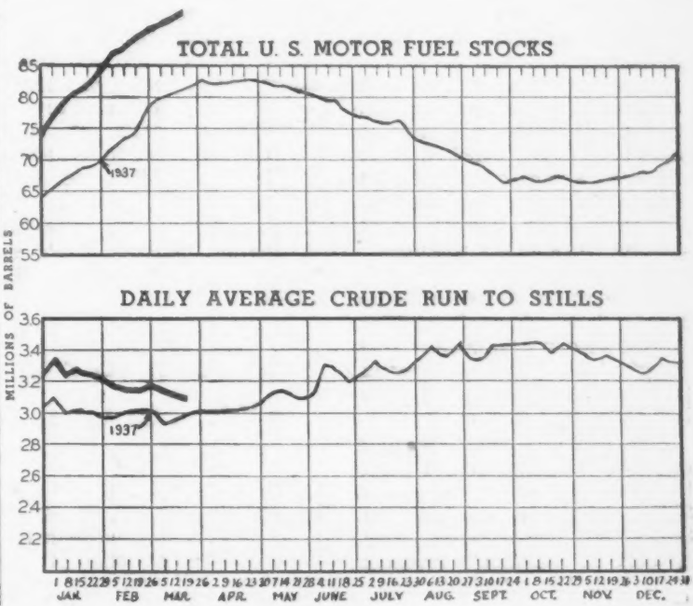
NEW YORK, March 22. — The rate of increase in gasoline stocks dropped sharply the third week of March when estimated total U. S. inventories rose only 108,000 barrels, report of the American Petroleum Institute today showed. This is the smallest weekly increase since the second week of December.

Crude runs to refinery stills were cut slightly and there was a substantial end-of-the-season decline in gas and fuel oil stocks. The Institute's estimate of gasoline stocks as of March 19 totaled 93,192,000 barrels, 12,794,000 barrels above actual stocks on the same date last year. Bulk of the increased inventories were held in the East Coast, West Coast, and Indiana - Illinois - Kentucky districts.

East Coast stocks rose 258,000 barrels last week and California inventories were up 226,000 barrels. These gains were pared down considerably by substantial inventory cuts in the Texas-Gulf, Inland Texas and Indiana - Illinois - Kentucky districts.

Total refinery stocks of gasoline increased 628,000 barrels while in-transit and terminal stocks and unfinished gasoline stocks dropped 337,000 barrels and 183,000 barrels, respectively.

A 751,000-barrel decline in gas and fuel oil inventories marked the first break in the upward trend of stocks reported by the Institute since early in February.



CURRENT REFINERY OPERATIONS

Districts	Per Cent Capacity Reporting	Daily Average Crude to Stills (Barrels) Week Ended		Per Cent of Reporting Capacity Operated Week Ended		Stocks: Thousands of Barrels Total Finished and Unfinished Motor Fuel*		Stocks: Thousands of Barrels Gas & Fuel Oil		% Total Capacity Reporting	Cracked Gasoline Production Daily Av. Production (Barrels) Week Ended	
		Mar. 19	Mar. 12	Mar. 19	Mar. 12	Mar. 19	Mar. 12	Mar. 19	Mar. 12		Mar. 19	Mar. 12
East Coast	100.0	503,000	488,000	75.2	72.9	22,534	22,276	9,015	9,300	100.0	115,000	101,000
Appalachian	88.4	88,000	90,000	68.2	69.8	3,649	3,670	1,252	1,250	94.6	21,000	21,000
Ind., Ill., Ky.	92.4	375,000	405,000	76.7	82.8	15,715	15,764	6,823	6,796	98.5	114,000	123,000
Okla., Kans., Mo.	84.7	245,000	246,000	64.0	64.2	8,196	8,204	3,426	3,433	90.3	63,000	65,000
Inland Texas	56.6	140,000	148,000	69.7	73.6	2,686	2,830	1,608	1,631	71.7	35,000	39,000
Texas Gulf	95.7	698,000	713,000	87.6	89.5	13,941	14,134	8,867	9,421	98.0	167,000	170,000
La. Gulf	96.6	149,000	132,000	88.7	78.6	2,334	2,363	2,972	3,063	100.0	20,000	24,000
No. La., Ark.	63.7	39,000	39,000	67.2	67.2	556	495	519	506	77.5	9,000	8,000
Rocky Mt.	69.7	45,000	46,000	72.6	74.2	2,345	2,338	781	771	85.4	13,000	13,000
California	90.9	520,000	514,000	69.7	68.9	16,276	16,050	84,304	84,107	98.0	66,000	67,000
Total Reporting	89.0	2,802,000	2,821,000	75.7	76.2	88,232	88,124	119,567	120,278	94.8	623,000	631,000
Estimated U. S. Total (Bur. of Mines Basis)		3,080,000	3,100,000			93,192	93,084	122,067	122,818		695,000	705,000

*Includes stocks at refineries, in bulk terminals, pipe lines and in transit.

among the 12 companies reporting monthly operations to the Western Petroleum Refiners Assn., is shown in the accompanying tables covering the past eight months. The figures are in barrels.

It will be noted from the bright stocks table that while stocks were reduced between June 30 and September 30 last year, they started upward again in October and were almost equal to the June 30 stocks by the end of October. Since that date they have in the past three months increased approximately 165,000 barrels.

Neutrals reached a stocks figure of 177,102 barrels at the end of August, a reduction of 26,000 barrels under the total on hand June 30. By the end of September, however, the stocks were back up to the June 30 levels, and since that time have increased a total of 55,000 barrels.

Alabama Oil Men Hold Annual Convention

By Telegraph

MONTGOMERY, Ala., March 21.—More than 400 persons attended the first annual state convention of the Alabama Petroleum Industries Committee held here today, which was featured by a parade and presentation of a "birthday cake" to Governor Bibb Graves, representing gasoline tax revenues.

General Baird H. Markham, director of the American Petroleum Industries Committee, who came down from New York to give the principal address, reviewed the 15 years of gasoline taxes in Alabama.

The average retail gasoline outlet in Alabama does a gross business annually of about $7000, and the tax collector gets $4400, Markham declared. Nearly half of Alabama's revenues come from the petroleum industry and its customers, he pointed out, urging co-operative action to correct existing tax evils.

After the welcoming speech by Mayor William Gunter, addresses were given by C. M. Graham, Montgomery County P.I.C. chairman; H. R. Meador, New Orleans; M. S. Kennamer, Limestone County P.I.C. officer; and H. H. Houk, chief engineer of Alabama highway department, who spoke against diversion of gasoline taxes.

The parade was participated in associations of motorists, truckers, road builders, automobile dealers and others interested in the proposed anti-diversion amendment to the state constitution.

N.Y. Oil Probe To Be Extended

N. P. N. News Bureau

NEW YORK, March 21.—Life of New York State's joint legislative oil investigating committee was extended until Feb. 15, 1939 by a resolution adopted by both Houses of the legislature. The committee receives an appropriation of $7500 to continue its work. The resolution as introduced asked for $15,500.

Representative Harold B. Ehrlich, Buffalo, chairman of the committee, introduced the resolution in the House.

The resolution states that "great numbers of independent retail dealers have requested that this committee investigate and make recommendations relative to their problems in an attempt to better their economic condition."

It also asks that the committee study and investigate dealers costs and selling prices and "agreements and arrangements and methods under which they operate and conduct their business, their relationship with producers, distributors and other dealers not classified or considered as independent, and the relationship of each of such classes to the other in so far as affecting the independent dealer.

The resolution also extended the time for the committee's report from April 1, 1937, to Feb. 15, 1939.

'Gas' Dealer Set Free In Price Law Case

CLEVELAND — E. C. McClung of Butler, Pa., the first service station proprietor to be arrested under criminal provisions of Act 307, Pennsylvania's price posting law, has been freed by the grand jury of the Butler County criminal court.

McClung, whose station is located on Route 6 in Butler Township, was apprehended on Jan. 11 by state motor police who asserted they purchased five gallons of gasoline for one dollar, but the price on the pump was 22 cents per gallon. McClung said in his defense that through an error regular gasoline had been placed in the premium motor fuel pump, so that he could not charge the full posted price without cheating his customers.

He was set free by the county grand jury, which directed Butler County to pay the arrest costs of $25.96.

Contents

NEWS

Shun Dirty Toilets As Unsafe, General Public Being Taught.... 9
Mexico Seizes Oil Properties in Labor Fight 9
Major Oil Companies Back Railroads At 6.6 Hearing 9
Gallonage Rental Wouldn't Change IRB Rule, Is Hint 9
FDR Balked in Effort To Cut Fund for Roads 10
ICC Asked To Suspend Hike in Freight Rates 11
New Truck Law Nears Passage 11
Proponents of 'Alky Gas' Keep It Before Congress 12
Hearings Sought On Biermann Bill 12
Minimum Profit Standards 13
Toilet Clean-up Drive Is Praised By A.A.A. 14
Syphilis Drive Arouses Public in Mid-West.. 14
Texas Enlists Newspapers In Drive To Clean Toilets 15
High Rest Room Standard Set By California Oil Companies 15
Worker's Standard Raised By Clean Factory Toilets 20
Editorials 16
Refiners From Every Section On Tulsa Oil Expo Committee 18
Texas Decision May Encourage More Drilling 19
Rising Output Fills Storage in California 21
Turner Valley Competitor of Mid-Continent 21
April Gasoline Demand To Show Gain Over '37 22
'Early' Depletion of Oil Reserves Called 'Bugaboo' 22
A. P. I. Refinery Figures 23
Lube Plant Shut Down In West Tulsa 23
N. Y. Oil Probe To Be Extended 24

MERCHANDISING

Salesmanship Key Factor in Car Lubrication. 25
Novel System Cuts Rubbish Collection Cost 72 Per Cent..... 32
Why Drain Crankcases, and When? *By George A. Round* 34
Automotive Notes and Comments 40
New Models Are Station's Best Gasoline Customers 42
Correct Use of Meters Holds Down Plant Losses 44

MARKETS

Mid-Western 53
Eastern 53
Wax 53
Mid-Continent 53
Coastal 53
California 56
Pennsylvania 56
Fuel Oil 56
Refinery Tank Car Markets 54, 57
Tank Wagon Markets 58, 59, 60
Seaboard Market 61
Crude Oil Markets...62, 63

DEPARTMENTS

New Patents 47
New Equipment 50

Polymerization—Magic or Headache?

By ARCH L. FOSTER, Technical Editor

Polymerization of natural and refinery gases has been discussed and written about more probably during the last three years than any other technical subject which occupies the minds of petroleum technologists. Its possibilities are so great, the opportunity for reduction of present-day gas waste so broad that the activity in further development of polymerizing technology will undoubtedly continue at an increasing rather than diminishing rate.

The first plants built to recover refinery gases utilized the well known reaction of joining together in chemical wedlock two olefins, each possessing a double bond between carbon atoms, a highly reactive nucleus capable of combining with a great number of elements and compounds including other hydrocarbons, halogens as chlorine, oxygen, ammonia, sulfur, etc. Later work has shown that the combination of olefin with paraffin, as for example butene containing a double bond and butane a fully saturated four-carbon molecule, is eminently practicable, technically at least. This reaction is differentiated by the term alkylation. A hydrogen of the paraffin nucleus is detached, one of the two bonds of the olefin is broken and the resulting molecule is saturated, having the type formula of the paraffins, and iso-paraffins, $C_nH_{2n}+_2$. The paraffins are notoriously the worst offenders in knocking; the iso-paraffins are among the best in octane rating.

Theoretically and technically, it is a comparatively simple matter to dehydrogenate a portion of the straight-chain paraffins in refinery and natural gases to olefins, and then comine, or alkylate paraffin with olefin. This reaction produces mainly branched chain saturated hydrocarbons of the type of iso-octane, or 2, 2, 4-trimethyl pentane, in which three methyl groups are attached to "inside" or secondary carbon atoms of the main five-carbon chain. Similar reactions can be carried out with naphthenes, and with cyclic paraffins of the type formula C_2H_{2n}, to form more complicated formulae which possess high anti-knock ratings.

The isomer of the well known iso-octane, which is 2,2,3-trimethyl pentane and differs from the compound mentioned above only in the structure position of one methyl group, is reported to have an octane rating slightly higher than has the 2,2,4- isomer which is used as the standard for anti-knock determinations.

Now comes word that a new type of catalytic polymerization plant is being constructed "somewhere in the southwest," the Eldorado of gas production. This unit is reported to be designed on the basis of a patent structure differing from that on which more than a dozen catalytic units have been built and operated in the U. S. in recent years. If so it means the entry into the field of another development in catalysis, supplies another tool for the refinery to use in making new motor fuels.

Catalytic dehydrogenation has been under very intensive research for several years, but has not been announced as a commercial practicability as yet, an announcement which can be expected in the not distant future, we believe. Thermal dehydrogenation has already proved economical in larger units, followed either by thermal or catalytic polymerization to gasoline.

Another reaction partially developed by hydrocarbon-catalyst chemists is the "isomerization" of straight-chain, high knocking molecules to iso-forms. Normal butane may be converted to iso-butane; normal octane, nonane, decane, etc., can be converted to molecules with much higher octane ratings, and so on.

Refining Technology

Contents

90-Lb. Natural Gasoline Handled by Pipeline... by L. S. Wrightsman R-115

The most unusual pioneering accomplishment in years in the petroleum and gas industries is this pipeline system by which a mixture of propane, butane and heavier natural gas hydrocarbons is transported from East Texas to Humble Oil & Refining Co.'s refinery at Baytown, near Houston. The 80 to 90-pound material has been handled for 18 months without serious break or mishap.

E. Texas Gasoline Recovery System Important Conservation Step R-121

13,500 wells' gas production gathered through miles of pipe to remove natural gasoline for motor fuel, light hydrocarbons for polymerization system recovers 95% of butane, total recovery 7 gallons per M cu. ft. gas.

Tube Failures in Refinery Still Tubes, and Their Causes... by E. C. Wright and H. Habart.. R126

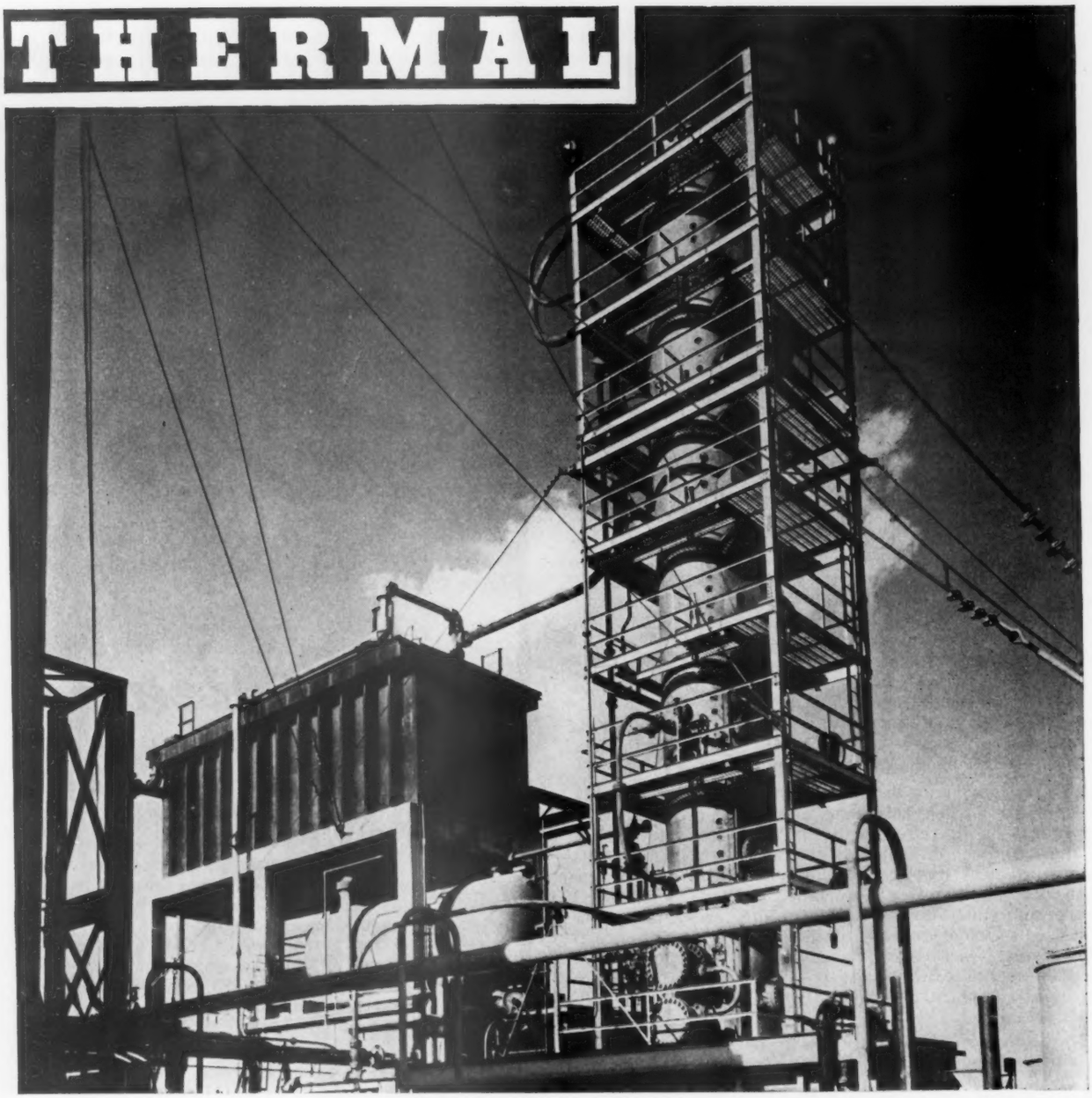
A wealth of data, with photomicrographs, showing how alloys are made which resist operating conditions in oil stills. Causes of different types of failure are shown, and how the information gained from failures has made possible the making of alloys to prevent failures.

Alloy Steels for Modern Still Tubes... by R. L. Wilson R-132

The special properties of a long list of metals for each condition, corrosion, oxidation, hardening, high temperatures and pressures, is shown here in a concise form, by one of America's best authorities on alloys for oil refinery still tubes.

Advertisers' Index ..... R-143 and 64

THERMAL



The use of THERMAL POLYMER Gasoline as a blending agent is rapidly increasing

The increased use of premium grade gasoline has made it very desirable for refiners and natural gas plant operators to have available a source of supply of superior blending gasoline.

Thermal Polymerization by utilizing by-product refinery gases, by-product natural gasoline plant gases or both, for making superior blending gasoline has proven an economical method of producing such stocks.

Licenses granted under United States and Foreign Patents by

THE POLYMERIZATION PROCESS CORPORATION

15 Exchange Place — Jersey City, N. J.

POLYMERIZATION

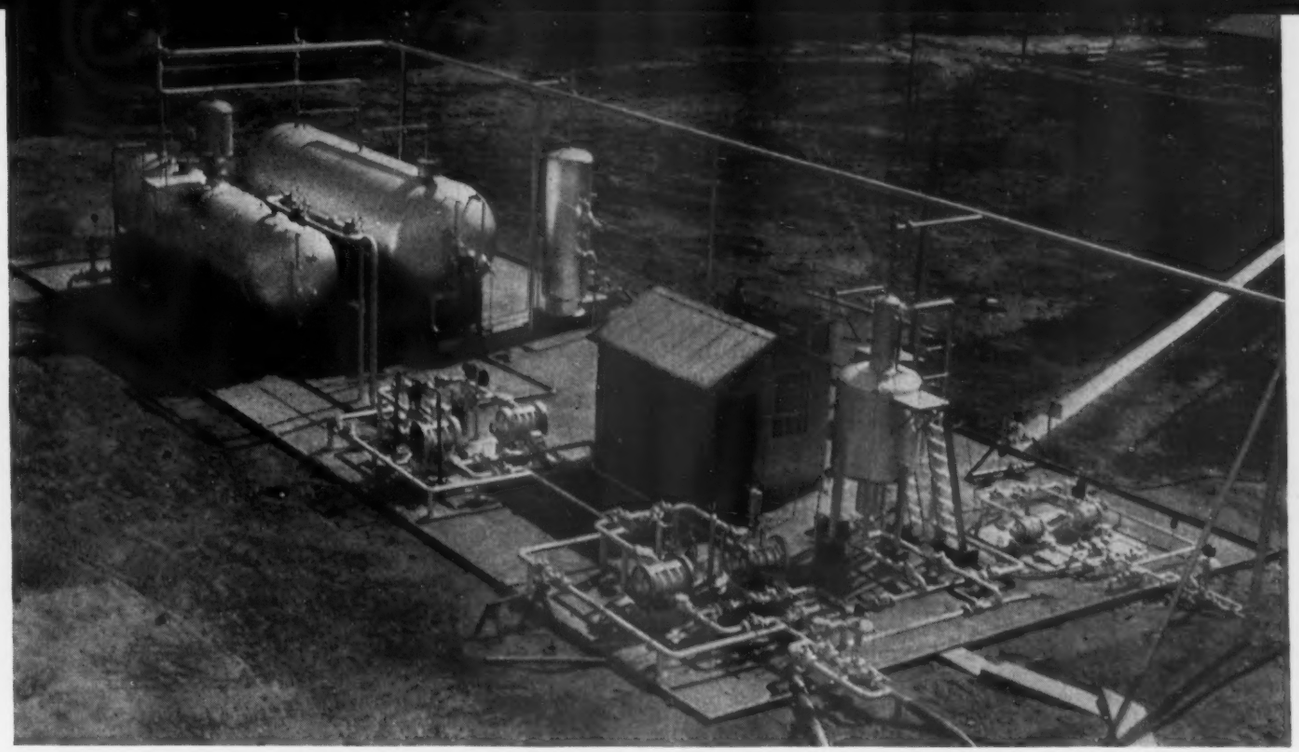


Fig. 1. Gathering station at London terminal of Humble's gasoline pipeline system. Note the meters in three sides of the small house, and the meter-calibrating tank in right foreground

625.
605.
674.

90-Lb. Natural Gasoline Handled By Pipeline

By L. S. WRIGHTSMAN*

Abstract

Part of an old 8-inch crude line was taken up, welded, treated and wrapped, and combined with new 8-inch line, and the whole cleaned with water, kerosine and caustic soda solution, each portion of cleaning fluid being followed by a pipeline scraper, reducing the amount of discolored gasoline to a minimum, when the line started operating. The line was tested to 800 lbs. pressure before starting operations.

Gasoline from two gathering systems, serving eight natural gasoline plants is brought through meters to pressure storage, picked up by centrifugal pumps and sent to Baytown refinery, 300 miles away. There the propane-butane is fractionated from the mixture. Meters correct to volume at 60° F. automatically, are checked twice each month for accuracy.

ABOUT EIGHTEEN months ago the Humble Pipe Line Co. entered a new field in the transportation of petroleum products by placing in operation a gasoline line between London, Texas, and the Humble Oil & Refining Co.'s Baytown refinery, a distance of approximately 300 miles. The system was built primarily to furnish charging stock for the Humble's new polymerization plant at Baytown. The product handled through the system consists of a mixture of casinghead gasoline, propane, and butane, produced in the East Texas field by the Humble plants and by plants operated by Hanlon-Buchanan and others. Upon arrival at the Baytown refinery the mixture is processed through a recently completed stabilization unit which separates the various hydrocarbons in order that they may be utilized to the best possible advantage. In this way the lighter fractions are made available for charging the polymerization plant.

Since the new line was to parallel the East Texas-Baytown crude pipe line, certain sections of the crude system were converted to gasoline service. Other sections were built by laying new lines. The old lines were all taken up, welded, treated, and wrapped, and the new line was treated in the same manner, so that a single 8-inch, all-welded line was provided. The line was then tested to 800 pounds; and before moving any gasoline, the entire system was thoroughly cleaned, since it was desirable that the least possible quantity of gasoline be discolored in moving down the line.

*Humble Oil & Refining Co.

The cleaning process consisted of pumping from London small batches of water, kerosine and caustic solution, each batch being separated by a pipe line scraper. The last batch of solution was followed with water, a scraper, and eighteen-pound casinghead. This cleaning procedure was so satisfactory that only a small amount of gasoline was off-color and of course, the kerosine was re-run at the Bay-

town refinery. The cleaning procedure proved also to be a good test for the entire system, since the same pumps were used which were eventually to handle the casinghead products.

At the beginning of the gasoline movement the volumes available for pumping were rather small, which made it impossible to put the line up to capacity; therefore, the actual pumping rate was very low. Under these conditions it was almost impossible to displace all of the water from the system; however, as soon as the pumping rates were increased, the last traces of water were swept out of the system, and little water has been received at Baytown since.

AT the London gathering station shown in Fig. 1 the light hydrocarbon products are received into the metering station from two different sources, the Humble Oil & Refining Co.'s system and Hanlon-Buchanan's system. At this point settlement is made between all parties concerned, and tariff is applied by Humble Pipe Line Co. The product first moves into what is called the "settling drum", which is a horizontal 8 x 30 tank installed for the purpose of removing water, vapor, or foreign matter from the stream prior to the metering operation. Since the product is received into this drum at rates of several hundred barrels per hour, a vent or overflow tank is provided to handle the stream should some regulator fail to function; in such a case the vent tank, being a horizontal 10 x 30 foot tank, has sufficient capacity to handle the stream until the proper regulation can be reestablished. Should it be impossible to reestablish proper regulation, the vent tank will relieve through large capacity relief valves into an open flare pit where the excess would be burned.

An additional precaution was taken by installing on the upstream side of the settling drum, a regulator which will shut down the incoming stream and sound an alarm. Since the mixtures handled in this system are very high in propane and butane content, the product has a Reid vapor pressure in the neighborhood of 80 to 90 pounds; therefore, all equipment is designed for working pressures as high as 100 pounds. The settling drum and vent tank shown in Fig. 2 are equipped so that gas can be injected or bled off, in order that constant pressures in excess of the vapor pressure can be maintained at all times, this operation being, of course, entirely automatic.

Normally, the product passes through the settling drum and into the meter manifold where it is measured by positive-displacement type liquid meters. The meters are equipped with a thermostat causing all meter readings to reflect volumes corrected to 60° F. Upon leaving the meters the product passes through a back-pressure regulator and into storage. The back-pressure regulator is installed to maintain a constant pressure, eliminating the possibility of any vaporization during the metering operation. This regulator is operated by a liquid level control on the settling drum so that if the level in the settling drum rises, the regulator below the meters is automatically opened to prevent the settling drum from overflowing.

AFTER passing through this regulator the product moves into the storage facilities which consist of two 5000-barrel and two 2500-barrel Hortonspheres shown in Fig. 3. The spheres are operated at a pressure slightly in excess of the vapor pressure of the product at existing temperatures, but this pressure is some 10 to 15 pounds lower than the settling tank pressure. The spheres, as well as the settling tank, are designed for a maximum working pressure of 100 pounds.

Since it is desirable that a stream uniform in composition be received at Baytown, the spheres are equipped with an internal riser extending up some ten feet within the tank so that the contents will be more uniformly mixed. Each sphere is also equipped wih gauge columns, dial indicating thermometers, sample connections, and all necessary safety devices such as ample relief valves, bursting heads, and a separate dump line with remote control gate. Provision is also made by means of regulators to maintain sufficient pressure on the spheres to prevent vaporization and at the same time to guarantee proper pressure on the pump suction.

Since proper control depends to a large extent on the

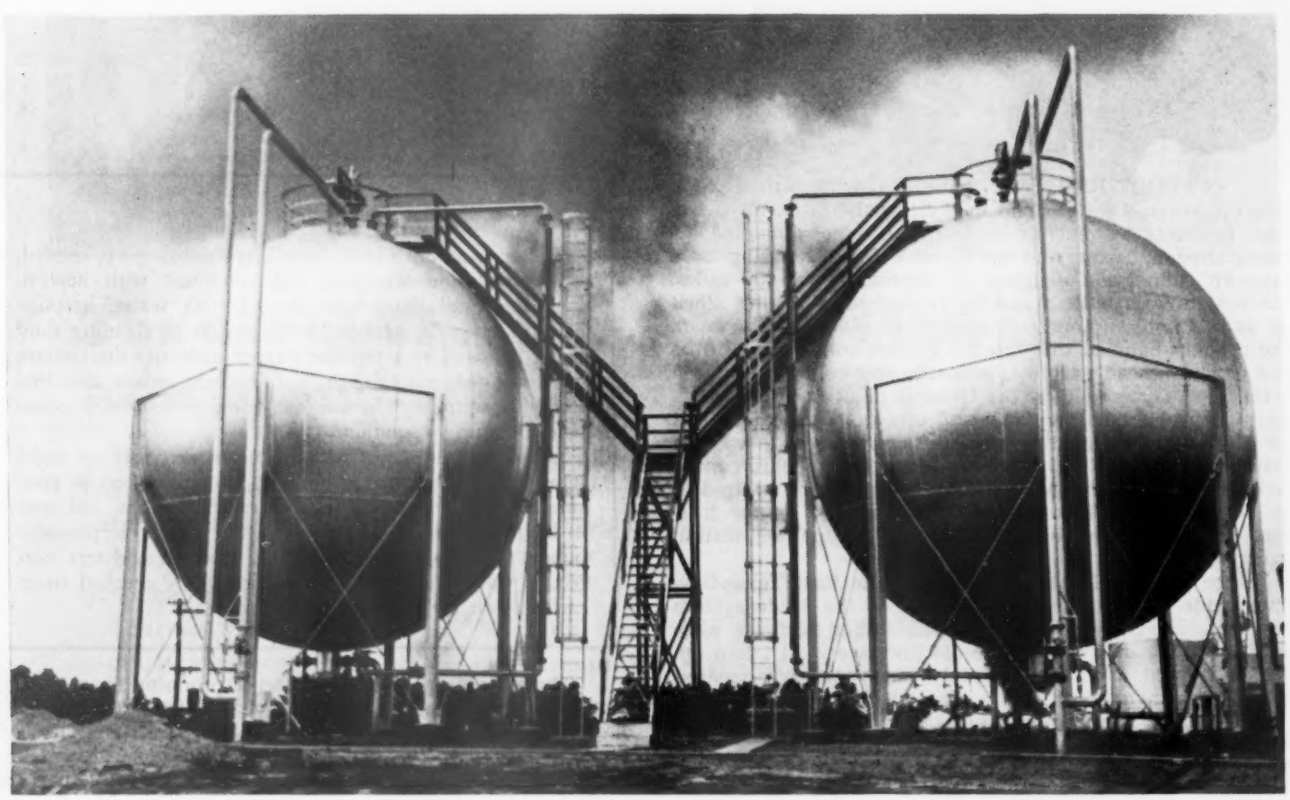
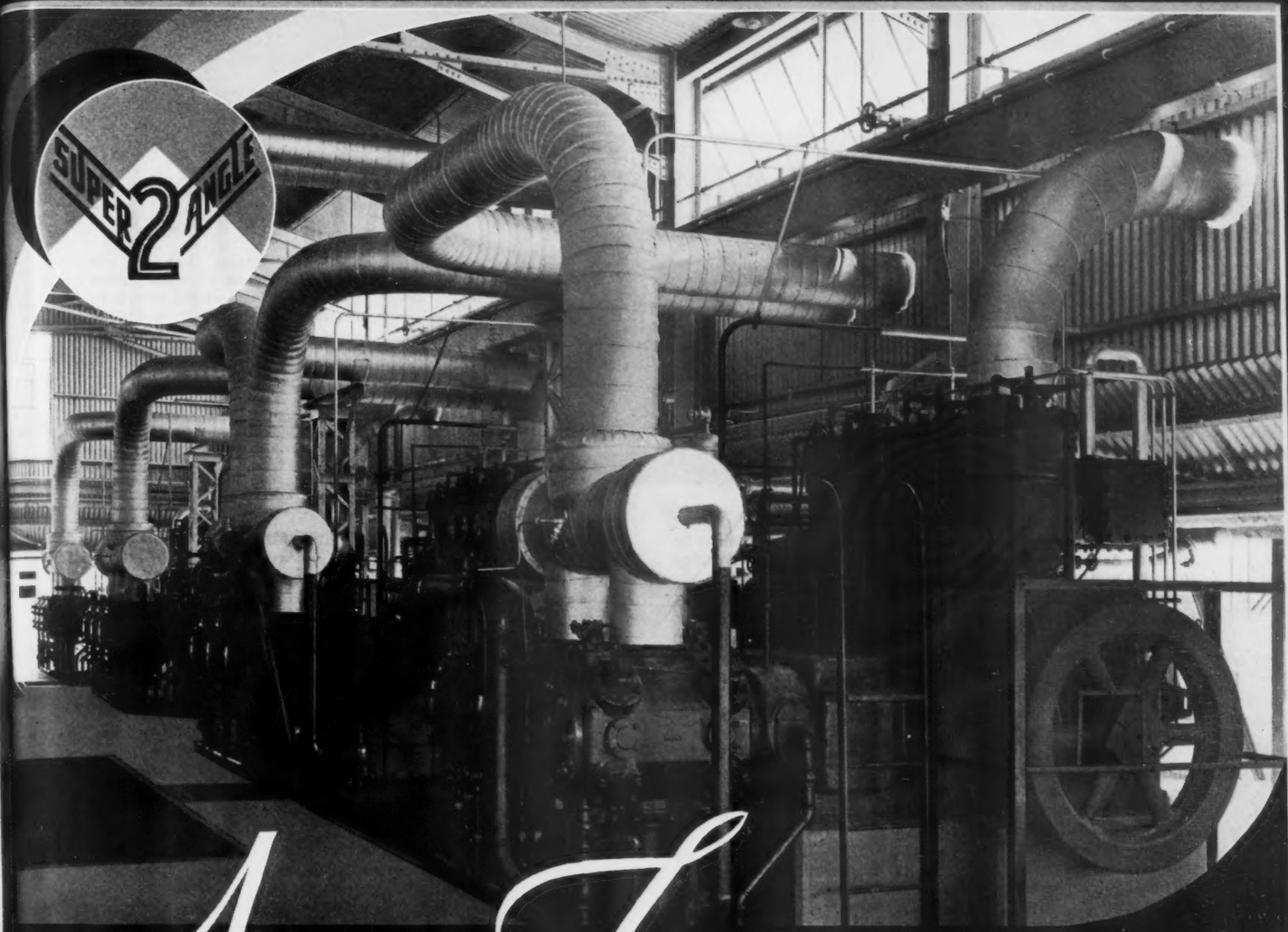


Fig. 3. Two 5000-barrel and two 2500-barrel Hortonspheres are used as gasoline storage at London, from which the line pumps take suction



Always First IN THE FIELD!

Propane Refrigeration Compressors, Humble Oil & Refining Company Thermal Polymerization Plant, Baytown, Texas. Plant engineered and constructed by M. W. Kellogg Company.

CLARK Super-2-Angle Compressors are now widely used in refining and gasoline plants, re-pressuring plants, booster stations, etc. These compressors are achieving important savings through (1) being shipped assembled, (2) occupying less floor space, (3) minimum fuel and maintenance costs. Write for details or

See CLARK Section, 1937 Composite Catalog

CLARK BROS. COMPANY . . . . . Olean, New York, U. S. A.

Export Office: 30 Rockefeller Plaza, New York; Midcontinent Sales Offices and Warehouses, Tulsa, Okla., and Houston, Texas. West Coast Office: Smith-Booth-Usher, 2001 Santa Fe Ave., Los Angeles, Cal. Foreign Offices: 73 Turnmill St., E. C. 1, London, England; 4 Str. General Poetas, Bucharest, Roumania

CLARK

Exterior View, Humble Polymerization Plant, Baytown

3-Cylinder, 300 H.P. Size, CLARK Super-2-Cycle Angle Compressor

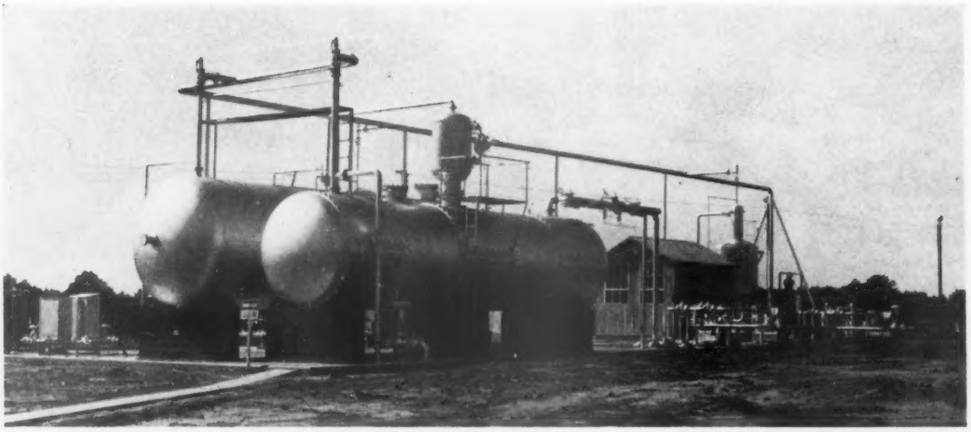


Fig. 2. Settling drum and vent tank at Humble's London pipeline station. The lines and venting arrangement shown are so adjusted as to permit injection or blow-off of gas to maintain constant pressure

vapor pressure of the stream, automatic vapor pressure recording instruments are installed on all streams delivering into the metering station, and a slip stream passes from the down-stream side of the meters into the recording vapor pressure machine, enabling the operators to know the vapor pressure of the streams at all times. Another slip stream moves from each incoming stream into a sampler which is so designed that it accumulates a continuous, proportionate sample of the stream. These samples are analyzed by the laboratory for purposes of settlement between the parties involved.

All meters are accurately checked twice each month against a calibration tank, shown in Fig. 1, of known capacity. The tank is of 1000-gallon capacity and is so designed that at the points where measurements are taken, the diameter of the tank is small enough to reduce to an absolute minimum the possibility of errors in gauging. All meter calibrations are made by the pipe line company and witnessed by representatives of the seller. In calibrating a meter the stream on the discharge of the meter is cut into the calibration tank until the tank is filled; then the liquid is forced out with residue gas until the level is at the approximate center of the lower dome section. The opening gauge on the calibration tank is then read very carefully, after which the stream is again switched into the tank with an opening meter reading taken at precisely the time the stream is switched. The meter is then metering the quantity which is moving into the calibration tank, and as the level shows up in the upper dome, the stream is switched out of the calibration tank with a closing meter reading taken at precisely the time the switch is made. Since the meter reading is net at 60° F., the volume shown by the calibration tank must be corrected to 60° F. The volume shown by the meter is then compared with the volume shown by the calibration tank and the difference between these two volumes indicates the accuracy of the meter. Since the calibration tank was originally measured or calibrated by representatives of the State Bureau of Weights and Measures, it is assumed to be correct, and if the meter fails to check with this volume, it is agreed that the meter is in error. The meters are so designed that they can be readily adjusted whenever necessary; however, experience has shown that it is not uncommon for these meters to check well within one-tenth of one per cent.

The London pump station is located approximately one hundred yards from the metering station. The pumping equipment consists of two eight-stage centrifugal pumps connected through speed increasers to 300 H.P. gas engines and a similar but smaller pump directly connected to a 200 H.P. explosion proof electric motor. Fig. 4 shows two of the pumps and speed increasers. The pumps are designed with a mineral seal oil circulating system around the packing glands and since pump suction pressure is carried on both glands, the mineral seal oil pressure is held slightly

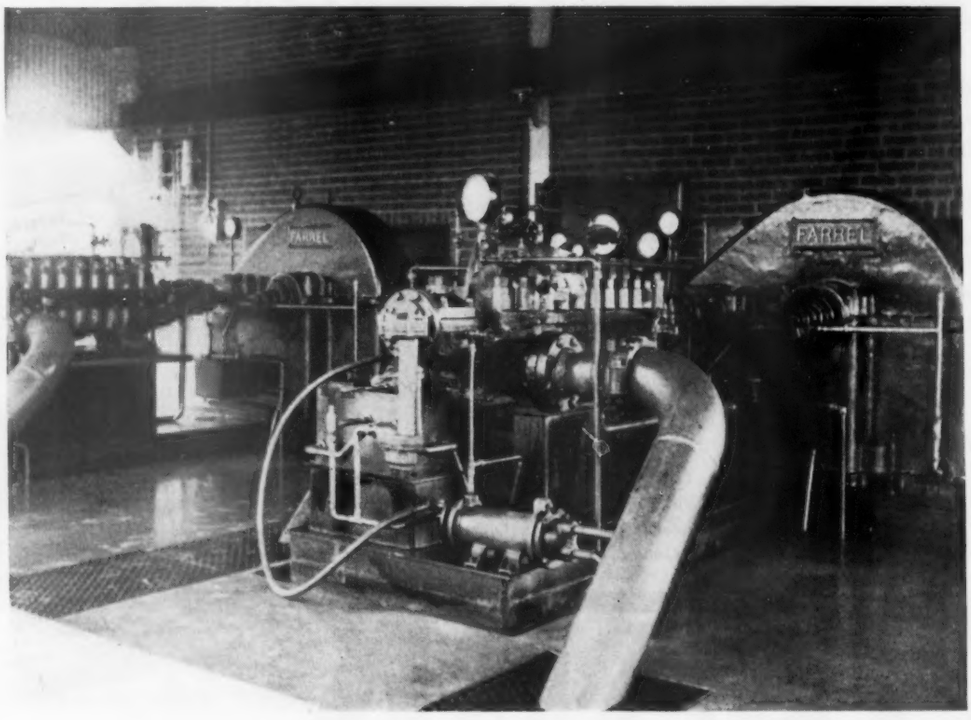
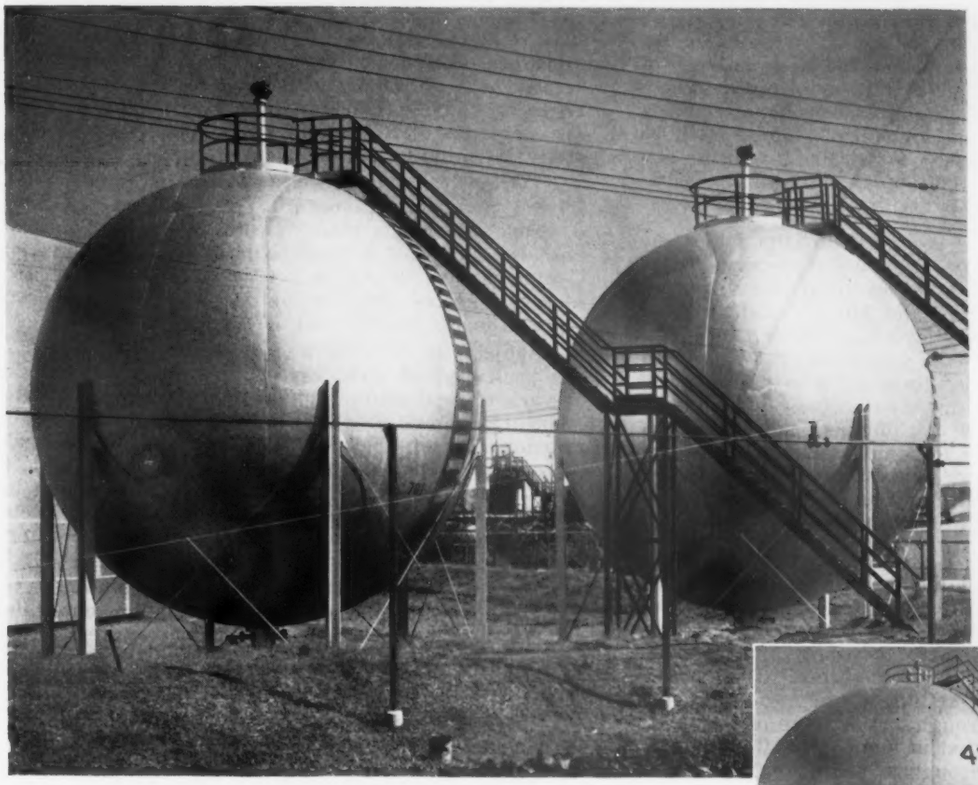


Fig. 4. Two pumps and speed increasers used as main line pumps on the London-Baytown pipeline

HOW TO MAINTAIN A STEADY SUPPLY OF RAW MATERIALS AT POLYMERIZATION PLANTS



At the left are two 2,500 bbl. Hortonspheres located in Baytown, Texas. They are built for 100 lb. per sq. in. pressure.

The picture below shows two 10,000-bbl. Hortonspheroids in Houston, Texas, which are for 15 lb. per sq. in. pressure.

AS described in this issue of *National Petroleum News*, pioneers in the field of polymerization are now making use of Horton *pressure storage* vessels to insure maintenance of a steady supply of raw materials. By gathering in light natural gasoline hydrocarbons as well as surplus refinery tail gases from various sources, it is possible to always have an ample supply—providing efficient, economical and dependable storage facilities are available.

With the Hortonsphere and the Hortonspheroid, it is easy to fit the exact requirements for any plant. The Hortonsphere is widely used for holding both gas and liquids at pressures of from 25 to 100 lbs. per sq. in. or higher and is built in standard sizes of from 2,500 to 12,000-bbls. The Hortonspheroid is used for pressures from 2½ to 25 lbs. in sizes up to 30,000 bbls. and capacities up to 100,000 bbl. units for a maximum pressure of 15 lb. per sq. in. For complete information or quotations, address our nearest office.

Chicago Bridge & Iron Company

Cleveland	2206 Rockefeller Bldg.
Chicago	2125 Old Colony Bldg.
New York	3345—165 Broadway Bldg.
Philadelphia	1614—1700 Walnut Street Bldg.
Boston	1516 Consolidated Gas Bldg.
Detroit	1513 Lafayette Bldg.
Dallas	1439 Liberty Bank Bldg.
Birmingham	1534 N. Fiftieth Street
Houston	2919 Main Street
Tulsa	1607 Hunt Bldg.
San Francisco	1060 Rialto Bldg.
Los Angeles	1422 Wm. Fox Bldg.

FABRICATING PLANTS in Birmingham, Chicago and Greenville, Pa.

HORTON PRESSURE STORAGE

higher than the suction pressure, thereby eliminating any leakage of volatile liquid from the glands. One of these pumps operating at a discharge pressure of 700 pounds will move approximately 11,000 barrels of the product through the 300-mile line to Baytown. Some six months after the line was put in operation additional volumes were available and it became necessary to install a booster station at Hearne, Texas, approximately midway between London and Baytown. This installation increased the line capacity to approximately 15,000 barrels per day, and additional boosters have been installed between London and Hearne and between Hearne and Baytown, to bring the line capacity up to approximately 20,000 barrels per day. In view of the extreme volatility of the products handled and the cost of high pressure storage at London and Baytown plans were made to move the product as rapidly as possible after being produced, thereby reducing the amount of storage facilities needed. At Baytown the product moves directly to the stabilization units where it is split up into its various components each of which is utilized with no appreciable delay.

Additional production is received into the main line from both the Conroe and Tomball plants of the Humble Oil & Refining Co. This product moves from the respective plants through a combination 3 and 4-inch welded line, approximately 28 miles long, to Satsuma, at which point it ties in with the 8-inch main line. The volume produced by these two plants is not great and it is pumped into the main line constantly as produced. The production from these plants is metered with the same type of equipment as used at London; however, where the line ties in at Satsuma, an orifice meter is also installed in order that the volume delivered into the main line at this point may be checked against the amounts pumped by the two plants, making it easy to detect any leakage.

On the Baytown end of the system the stream first passes through a back-pressure regulator and then into an 8 x 30 settling drum similar to the London installation. The settling drum is installed primarily to remove any traces of water or foreign matter prior to metering. The stream flows out at the top of the settling drum into the meter manifold where it passes through one or more of the three meters of the same type used at London. After passing through the meters and through a second back-pressure regulator the stream moves into one of the Hortonspheres.

The back-pressure regulator upstream from the meters was installed to prevent excessive pressure on the settling drum or meter manifold, while the regulator on the down stream side of the meters was installed to maintain sufficient pressure to prevent vaporization within the meters. The settling drum, of course, is equipped with proper relief valves tied into a common dump line along with a relief valve upstream from the main line header gate. This precaution is taken to provide for the possibility of a gate being accidentally closed. In addition to these installations the Baytown end of the system is also equipped with orifice meters, recording pressure and temperature instruments, and sampling devices. An ordinary displacement type of water meter is also installed on the water outlet from the settling tank in order that record can be kept of the water drawn off to compare with volumes put in the line, if it ever becomes necessary to make a water spot in order to repair a serious leak.

Since the line was started, the entire operation has been very successful. No serious line breaks have occurred and losses on handling this extremely volatile product are within the allowance originally set up to cover same.

Due to the extreme volatility of this product, the hazards in handling and in repairing of leaks are appreciated by the management as well as the operating personnel. The constant watchword is "SAFETY", and special crews have been organized to make repairs on this system whenever necessary. These crews are furnished with the very best of equipment, including spark-proof tools of all description, First Aid kits, and fire extinguishers; and every possible precaution is taken to prevent an accident.

Petroleum Metering Conference Sponsored by A. S. M. E.

A conference on the metering of crude oil and its products at Norman, Okla., April 7 and 8, is being arranged by the School of Mechanical Engineering, University of Oklahoma, in co-operation with the petroleum division of the American Society of Mechanical Engineers.

The conference was approved by the A.S.M.E. subcommittee of the Fluid Meters committee after deciding in January to include a study of all types of fluid meters which might be used for measuring petroleum products and their problems, in the scope of its activities. The conference will afford a desired and needed opportunity for engineers of the industry to review the experiences of oil companies in using different types of meters and to study metering problems.

During the past several years an extensive experimental program has been in progress on the metering of crude oil and its more viscous products. The A.S.T.M. has also sponsored a research project at the University of Oklahoma to determine coefficients applicable to the measurement of the flow of oils when using differential types of orifice, nozzle, and venturi throat flow meters.

Subjects to be presented at the conference will cover the principles of metering oil, operation and limitations of various type meters, application of meters to measurement of flow, and problems involved when using meters to measure flow of crude oil. The metering of the crude oil in relation to pipeline flow will be the main subject for the afternoon session of the first day and metering in the refinery will be featured the following morning. Metering in the production branch is scheduled for the afternoon of the second day.

The announcement states the conference is to be "strictly educational" and no "convention entertaining" or "sales talks" will be permitted. Manufacturers of meters have been invited to display sectional models of their meters at the conference, however.

Heads Refinery Equipment Committee

Arthur E. Pew, Jr., Sun Oil Co., has been appointed chairman of the American Petroleum Institute's 1938 committee on standardization of refinery equipment. Appointment was announced by N. E. Loomis, chairman of the central committee on refinery technology. R. P. Anderson, secretary of the institute's division of refining, was named chairman of the committee.

Membership includes C. C. Ashley, Shell Oil Co.; D. G. Brandt, Cities Service Oil Co.; L. L. Davis, Continental Oil Co.; A. J. Aly, Standard Oil Development Co.; E. W. Gard, Union Oil Co. of Cal.; J. G. Glasgow, Gulf Oil Co.; L. M. Goldsmith, Atlantic Refining Co.; John S. Hess, Sinclair Refining Co.; K. V. King, Standard Oil Co. of Cal.; W. D. Kinsell, Pure Oil Co.; R. G. Powell, The Texas Co.; G. W. Watts, Standard Oil Co. (Ind.); and M. P. Youker, Phillips Petroleum Co.

Consistency Symposium Published

Publication of a "Symposium on Consistency" is announced by the American Society for Testing Materials. The symposium, a discussion of present-day practices in consistency measurement, was arranged at the 1937 A.S.T.M. annual meeting in June by Committee E-1 on Methods of Testing. Nine papers with considerable discussion comprise the booklet.

Viscosity measurement of petroleum products and lubricants is covered by J. C. Geniesse, and flow properties of asphalts by R. N. Traxler. Some products of other industries are also covered in their relation to consistency measurement. Two papers deal with recent progress in consistency measurement, its definition and theoretical considerations.

Copies of the publication, 73 pages in heavy paper cover, can be obtained from A.S.T.M. Headquarters, 260 S. Broad St., Philadelphia, at 85 cents each.

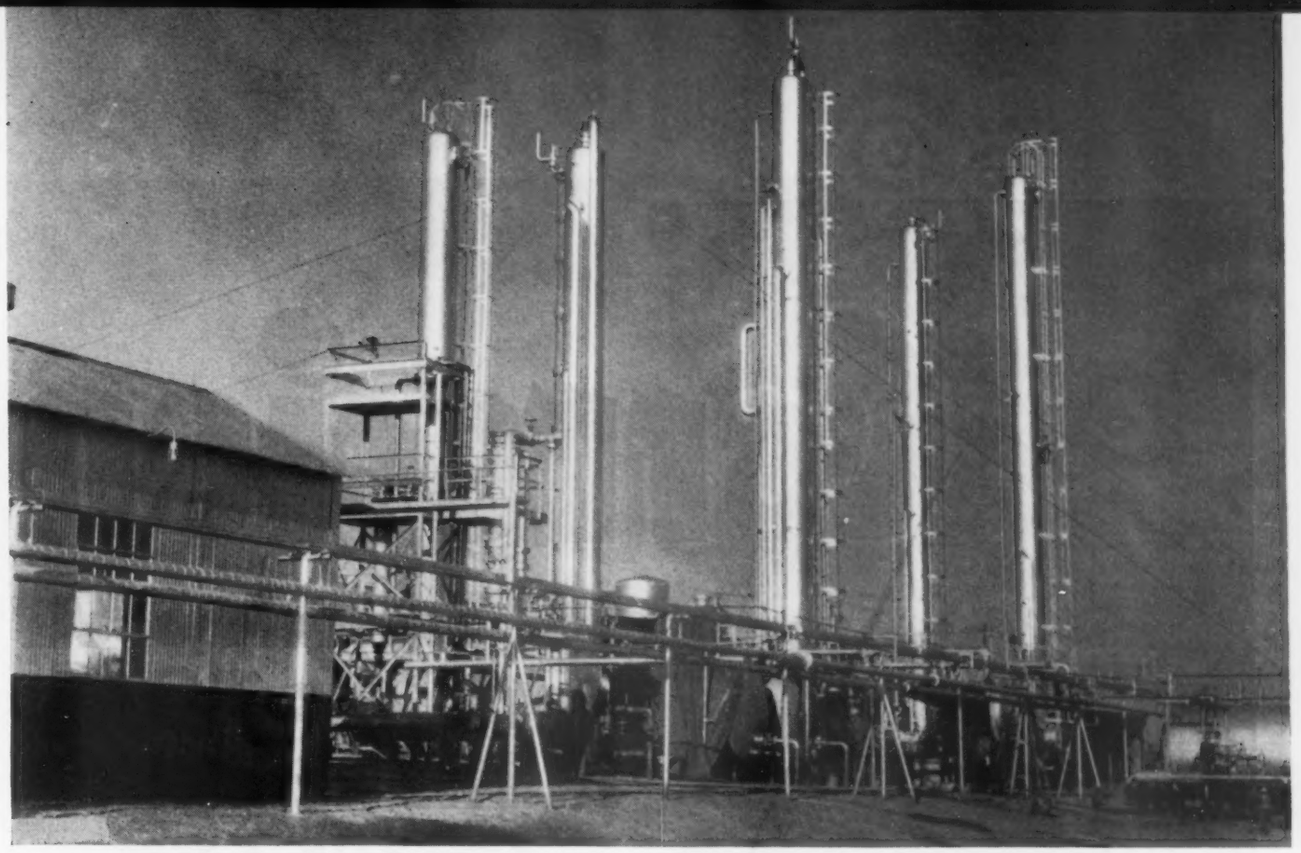


Fig. 1. The most orderly "confusion" marks the construction and layout of a modern natural gasoline plant. This shows towers and transmission lines of Humble's Laird Hill (Kilgore) plant in East Texas, one of the three plants included in Humble's own gasoline gathering system

775
778.3
778.4

E. Texas Gasoline Recovery System

Important Conservation Step

By ARCH L. FOSTER
Technical Editor

ABSTRACT

Gas at the rate of 85 million to 100 million cu. ft. per day is gathered from 13,500 wells in this mammoth gasoline recovery system, the gasoline and butane-propane extracted in eight plants at yields as high as seven gallons per M cu. ft., and the 50-to-90 pound vapor pressure product delivered through meters to the pipeline system which transports it to the Texas Coast for final separation into natural gasoline and "bottled gas" or polymerization unit charging stock.

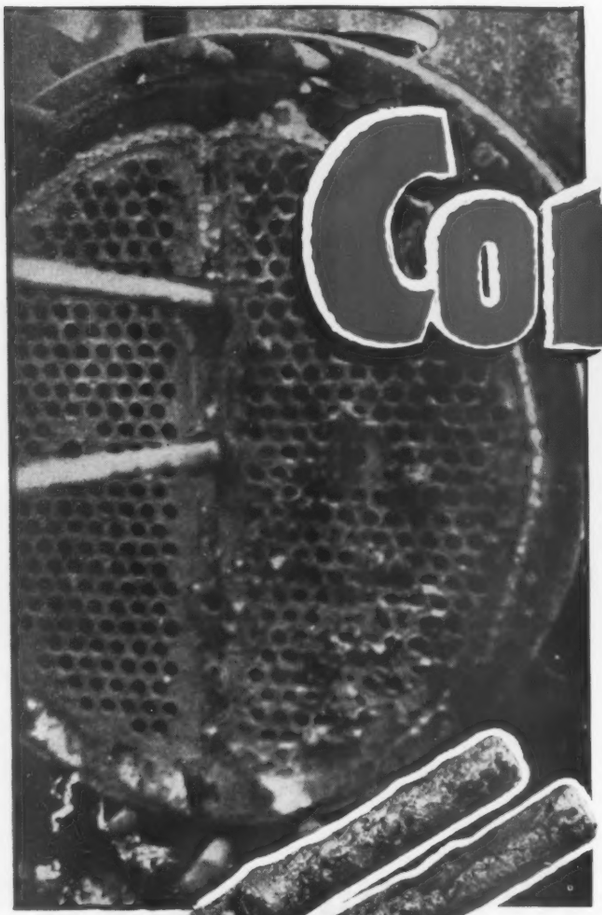
Stripped gas is returned to leases, used for domestic and industrial fuel, in the greatest gas-and-gasoline conservation step in the industry's history.

ONE OF the most remarkable developments in natural gasoline history is that of the Humble-Hanlon combination in the East Texas field. Combining the gas output of 13,500 wells in this nearly 25,000-well field, this group of 8 plants produces up to 400,000 gallons (10,000 bbls.) of butane and natural gasoline per day, processing as much as 85 million cu. ft. of gas which yields up to seven gallons of the natural gasoline-butane mixture per thousand.

There is nothing specially remarkable in this part of the performance, except possibly that 95% of the butane is recovered along with small amounts of propane which is not economical to eliminate entirely. The most interesting phase of the system is the handling of this huge volume of material which normally has a Reid vapor pressure of 50 to 60 pounds, but which may go as high as 90 lbs. if and when propane is included. The plants as they now operate can recover up to 40% propane from the gases processed, and by installing certain additional equipment may recover up to 70% propane.

Elsewhere in this issue another article describes the design and operation of the gathering and pipeline system which collects this high vapor pressure gasoline and pumps it to the Baytown refinery of the Humble company for separation into natural gasoline of the required vapor pressure and butane for processing in the non-catalytic polymerization unit operated at that plant. About half the volume of material to reach Baytown's special fractionating units is butane although the percentage may be greater on occasion.

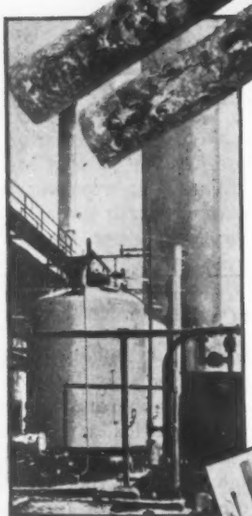
The plants included in this system are: Humble's three plants at Laird Hill (near Kilgore and called the Kilgore plant), London, and the American plant about midway be-



Corrosion

IS TAKING A *Terrific* TOLL IN THE REFINING INDUSTRY

Exchanger Head Corroded in Refinery Service



Scaling is an Ever Present Hazard in Refinery Operations

The cost of corrosion in the refineries of the United States has been authoritatively estimated to be $125,000,000 annually. During recent years the corrosive action of some crudes has become so acute that the problem had to be solved immediately, or refinery operations suspended. In one instance, shutting down of a comparatively new cracking plant resulted from this cause after a run of only sixteen days. The presence of salts in crude charging stocks now is definitely recognized as one of the principal causes of corrosion.

The Petreco Electromatic De-Salting Process has proved to be the simplest and most efficient method of solving corrosion problems for many refiners. In addition, it removes compounds which physically plug heat exchangers and fractionating equipment.

Refinery executives are invited to write for descriptive bulletin and further information relative to the Petreco Electromatic De-Salting Process. Preliminary investigations and advisory service involve no cost or obligation.

Petreco Electromatic De-Salting Plant at a South Western Refinery

PETROLEUM RECTIFYING COMPANY OF CALIFORNIA
GENERAL OFFICES: 530 West Sixth Street • Los Angeles, California
BRANCH OFFICE: Houston, Texas
Branches and Service Men in Principal Oil Fields

Fig. 2. Separators on the intake gas lines at Humble's Laird Hill plant

tween the first two; The Gregg-Tex plant between Longview and Gladewater; the Hanlon plant near Gladewater; the Parade Gasoline Co.'s plant below New London; Sabine Valley Gasoline Co.'s plant and the Lisbon plant. These plants are scattered over a distance of 25 miles through the largest oil field the world has ever seen and as later figures will show the amount of piping necessary to connect them is enormous, a major item in the cost of the entire system.

The three Humble plants have a total compressor capacity of 8100 hp., using two-stage gas engine-driven compressors. Combined these three plants have a daily gas capacity of 35,300,000 cu. ft. per day. They operate on the gas from 3600 wells, which are produced under present proration orders at the rate of 20 barrels each per day. One of the major difficulties faced by the operating superintendents of natural gasoline plants in prorated fields—first encountered on a large scale in the Oklahoma City field a few years ago—is the intermittent manner of flowing the wells. The East Texas wells are prorated at so low an output, that it normally requires only about half an hour to produce the day's quota from each well. After that quota has been produced, the well is shut in until the next day. Consequently, if all wells are flowed early in the morning, the gasoline plants are swamped for an hour or two, then would be forced to be idle the remainder of the 24 hours. Gasoline plants cannot be operated economically that way; in fact they cannot be operated that way at all.

It is necessary therefore to "stagger" the flowing of the wells during the whole day, to keep the plants operating. Fortunately, practically every lease operator in the field has been amenable to good reason in the matter of the time of day when he "draws" his crude quota, so that a systematic arrangement has been worked out to keep a fairly uniform supply of gas coming to the plants' supply lines, the only way by which the natural gasoline and light hydrocarbons in the raw gases can be recovered economically. And if not so recovered, millions of gallons of the most valuable motor fuel material, and at least an equal quantity of butane, with some propane, valuable for polymerization charge stock and other industrial uses, would be burned either for lease and domestic purposes in the field, pumped into municipal gas supply lines, or wasted in flares.

And the East Texas field gas is rich indeed in these hydrocarbons, in comparison with gas from many other fields, the Texas Panhandle for example. Although the yield varies considerably between winter and summer, and with the different oil-gas separator pressures which may be maintained at the wells, a typical yield figure for 26-70 natural gasoline plus approximately 95% of the total butane is about seven gallons per 1000-cu.-ft. Typical analyses of raw field gas, as taken during August in a hot climate when the percentages of heavier hydrocarbons may be expected to be a maximum, is as given in Table I.

TABLE I

Typical analysis of Raw gas, East Texas field

Constituent	% Summer	% Typical Average
CH_4	45.89	46.0
C_2H_6	9.40	13.5
C_3H_8	24.45	22.0
n-C_4H_{10}	9.28	12.0
i-C_4H_{10}	4.86	
C_5H_{12}	4.24	6.5
C_6H_{14} and heavier	1.88	
Total	100.00	100.00

The London plant of the Humble system is located immediately across the road from the terminal of the Humble

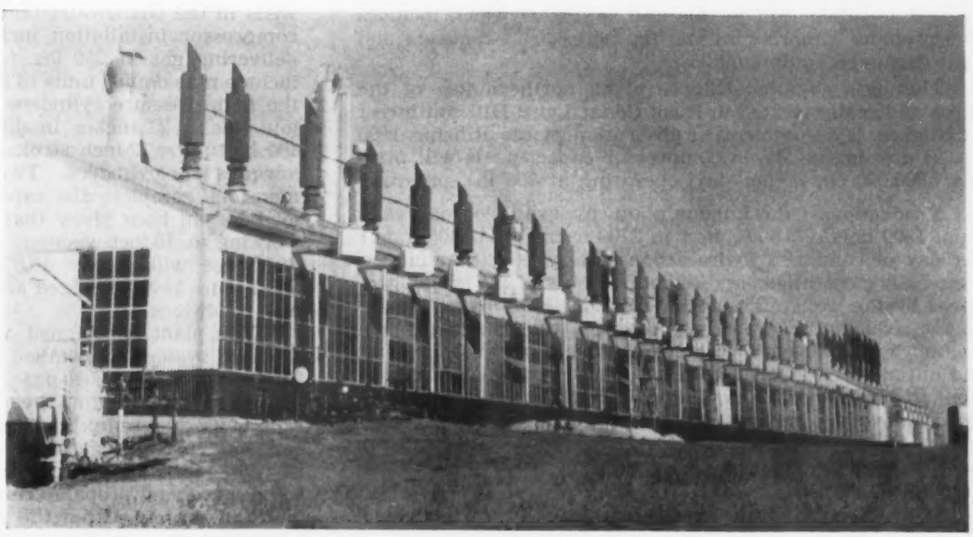


Fig. 3. A "forest" of exhaust lines from the Laird Hill plant's compressor battery helps to replace the pines which formerly covered all this East Texas territory

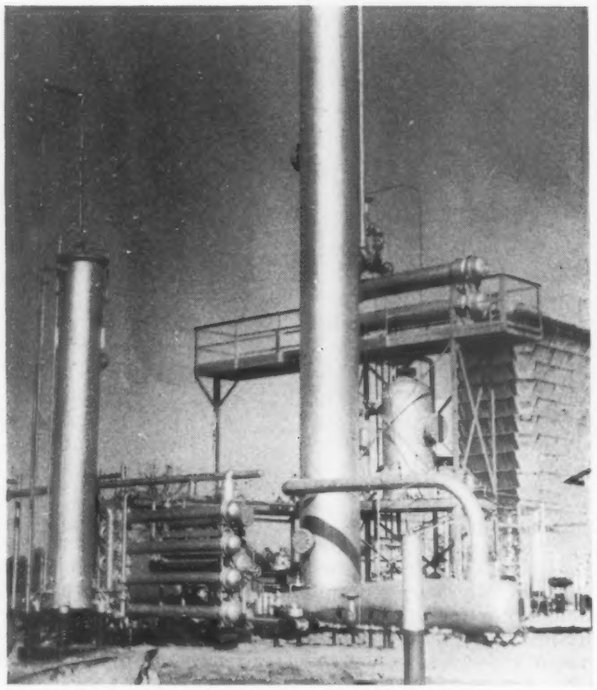


Fig. 4. Heat exchangers, reboiler, and stabilizing equipment at Humble's "American" plant, between New London and Kilgore

Pipeline system which carries the natural gasoline of both systems to the Baytown refinery. The rundown tanks of this plant feed the product directly into the storage tanks of the pipeline company, passing through meters which determine and record the quantities delivered.

This plant utilizes 4300 hp. of gas engine-driven two-stage compressors. It is a combination compression-absorption system, operating at about 300 lbs. pressure and capable of handling 16,000,000 cu. ft. of gas per day. As with all the plants in the field, the stripped gas is returned to distribution lines, and goes back to leases for use as domestic or lease fuel, or in case of excess, to municipal supply lines or to flares if any remains after supplying all other possible needs.

Humble's American plant, so-called because it was acquired some months ago from the General American interests of Shreveport, is located in Rusk Co., about four miles from Overton. It is equipped with 2000 hp. of compressors, and can handle 12,000,000 cu. ft. of raw gas per day. It is a vapor rectification type of unit, a system well-known and standardized in natural gasoline operations, operating at about 275 lbs. pressure. Propane is used as refrigerant in this unit, a system which includes two propane compressors and the necessary expansion and heat exchange equipment.

Humble's so-called Kilgore plant, northernmost of the three and really located in Rusk Co. at Laird Hill southwest of Kilgore, is a combination absorption plant, utilizing 1800 hp. of gas engine-driven compressor capacity. It will process 7,300,000 cu. ft. per day, operating at 300 lbs. pressure.

Production at the London plant, for example, may vary from 1800 bbls. (75,600 gals.) to 2700 barrels (113,400 gals.) per day of combined hydrocarbons, the yield depending on the weather conditions and of course the amount of gas produced by the wells. The recent "Sunday shutdowns" really meant reducing the weekly crude, and therefore gas, production by one-seventh with corresponding natural gasoline and butane production decreases. This production is equivalent to 46,000 gals. to 80,000 gals. of natural gasoline of 18 lbs. Reid vapor pressure. Or, the equivalent in 26-lb. natural is 55,000 gals. to 96,000 gals. (Volume of 18-lb. natural times the factor 1.2 very closely approximates the volume equivalent of 26-lb. material).

These plants operate to recover 95% of the available butane present in the gases. Natural gasoline of 18-lb. vapor pressure contains approximately 13% of butane; 26-lb. natural contains about 35% butane. The yield of surplus butane for charging stock to the Humble polymerization unit therefore varies, depending on the vapor pressure of the natural gasoline from the refinery stabilizer towers.

Practically 100% of pentanes and heavier are recovered by all these plants. As now equipped the plants can recover as much as 40% propane when desired for purposes such as solvent, polymerization charging stock, etc.

All recently installed vessels used to withstand superatmospheric pressures are built to comply with the API-ASME Code for Unfired Pressure Vessels. The Kilgore plant, for example, stabilizes the raw product to eliminate ethane and essentially all the propane, the propane remaining in the product being negligible in amount and allowed to remain to avoid loss of butane which in practice would be fractionated out along with the last traces of propane.

Reciprocating pumps, Worthington HiVols in this case, are used to force the highly volatile, partially stabilized products into the three-inch welded line which transports the products of the Kilgore and American plants to the main London plant, where any additional stabilization which may be necessary is carried out, before transferring the gasoline across the road to the meters, storage and pumps of the pipeline company there. From Kilgore to the American plant 13,000 feet of three-inch pipe are used. From the American to the London plant 20,000 feet of the same size pipe are required. As indicated, the London plant is equipped with fractionators which complete the stabilization, also several butane storage tanks, and a column for producing commercial butane if and when a supply of this product is wanted.

At the London plant a complete natural gasoline laboratory is installed, equipped for all distillation and analytical procedures required of such a laboratory. Here composite samples of the whole product delivered to the pipeline company are analyzed as a routine matter, to determine the quality of the delivered material. Similar tests are made on the products from other plants and lines in the system, as checks on the products delivered, and on the basis of which yields, costs and payments to individual companies are calculated.

INCLUDED at this central plant also is a liquid nitrogen unit. The nitrogen is used instead of liquid air—customarily used in low temperature distillations—because of the freedom from danger of explosions such as always exist when using liquefied air containing oxygen. This unit not only supplies all of this material needed by the plant and laboratory, but can supply the local requirements of other companies as well. The Hanlon plant also maintains a laboratory which does analytical work for itself and other units in that part of the system.

Gregg-Tex plant also typical of modern, efficient operation

The Gregg-Tex plant is equipped to compress 16,000,000 to 17,000,000 cu. ft. of gas per day, obtained from about 2250 wells in the Gladewater-Longview section of the field. The compressor installation includes 16 two-stage Clark units, delivering gas at 250 lbs. to the rectifying system. These include nine double units of 250 hp. each, with 20-inch stroke; the high pressure cylinders are 10-inch diameter, while the low side is 22 inches in diameter. Also included are five 400 hp. units, 12-inch stroke, with 12-inch high- and 26-inch low-pressure cylinders. Two 440 hp. units with similar dimensions complete the capacity. Test operations at peak load for an hour show that this assembly of compressors, working at 10-inch vacuum on the suction side and 250 lbs. discharge will deliver 16,670,000 cu. ft. per day. Recent operations have averaged about 14,000,000 cu. ft. under normal conditions.

This plant is designed on the absorberless "vapor rectification" system as installed by Petroleum Engineering, Inc. The compressed gases pass, along with any condensate, to the rectifying column, thence to a butane condenser. Butane is used as reflux in the primary column while propane, collected from the gases in the reflux accumulator, is used as reflux in the secondary column. In the condensation of these products propane refrigeration is employed, using liquefied propane from the secondary tower top. Bottoms

from the main towers enter an outside reboiler heated with live steam; nearly pure propane is taken from the stabilizer or secondary column top.

The propane refrigeration system consists of a compressor which takes propane vapors from the heat exchanger where they have been warmed while reducing the temperature of the liquids and vapors on their way to the rectifying column, compresses these vapors and sends them to the propane water condenser. This condenser is cooled with water from two wells, one 475 feet deep and the other 375 feet deep, the temperature of which varies only slightly with the seasons. The liquefied propane passes to an accumulator and thence as liquid to refrigerate the compressed gases going to the rectifying tower, and so repeating the cycle.

An interesting side light of the Gregg-Tex operation is the odorizing of all residue gases from the plant which is used as domestic or lease gas. A Peerless Odorizer is used, which consists of an 8-inch diameter vertical cylinder about five feet long, with the necessary piping and a one-inch by five-foot gauge glass. The cylinder is partially filled with Calodorant, and a pre-determined fraction of the residue gas is bubbled through this column of the odorant. Check is made of the gas as received at the residences of the company employes and the Odorizer is adjusted to maintain an unmistakable warning odor in the gas.

Parade can process 15,000 Mcf daily

Parade Gasoline Co.'s plan near New London, a conventional absorption type built in 1935, was revamped when this company joined the group supplying gasoline and butane to the Humble pipeline system. The ten twin compressor unit assembly was increased to 17 compressors, and the operation was converted to employ as absorber oil a product of around 58 A.P.I. gravity gasoline made from the heavier ends of the plant product which is automatically maintained in quantity and specifications by control of the fractionator. The column uses propane refrigeration, the absorber oil being maintained at a temperature in the early 60's or lower, propane from the overhead vapors of the "depropanizer" column being used for this purpose.

The plant can produce 90,000 to 100,000 gallons of natural gasoline and butane per day. A primary and a secondary absorption unit is used. The finished product is pumped to the assembly station "next door" to the Humble pipeline terminal through a 4-inch welded and wrapped line, at which station it is metered. All product is again metered by the Humble Co. before it is placed in storage, from which pump suction for the pipe line is taken.

Although gasoline-butane production varies considerably in quantity with operating conditions in the field, the accompanying Table 2 shows the number of wells connected, average amounts of gas handled, and the average amounts of butane and of gasoline produced daily in the East Texas field during November last, as reported to the Texas Railroad Commission.

TABLE 2

Butane and Natural Gasoline Produced in East Texas, November, 1937. Average, Per Day

Company	Wells Connected	Gas Processed Mcf.	Natural Gasoline gals.	Butane gals.
1. Ark. Fuel Oil Co.	1,344	7,893	30,543	11,140
2. Gladewater Gaso. Co.	214	1,818	6,568	.....
3. Gulf Prod. Co.	511	3,387	13,146	.....
4. Gregg Co.	37	275	1,100	.....
5. Gregg-Tex Gaso. Co.**	2,256	13,450	48,799	28,000
6. Hanlon Gaso. Co.**	2,324	14,375	56,419	83,094
7. Hercules Gaso. Co.	2,064	11,514	43,337	.....
8. Humble-London**	1,658	10,896	31,082	19,926
9. Humble-Kilgore**	964	12,502	35,761	.....
10. Humble (Gen. Amer.)**	1,007	2,681	8,822	.....
11. Lisbon Gaso. Co.**	1,643	11,052	37,410*	.....
12. Marr Gaso. Co.	19	1,420	1,096	.....
13. Nine Oaks Gaso. Co.	24	148	606	.....
14. Parade Gaso. Co.**	1,776	11,301	43,498	.....
15. Sabine Valley Gaso. Co.**	1,548	9,363	57,232	.....
16. Sinclair No. 18	2,219	15,391	54,478	.....
17. Sinclair No. 19	1,926	11,855	51,642	.....
18. Southport Refining Co.	170	1,210	3,325	.....
TOTALS	21,704	140,531	489,454	163,055

** Included in Humble-Hanlon pipeline system.
* Butane-natural gasoline mixture.

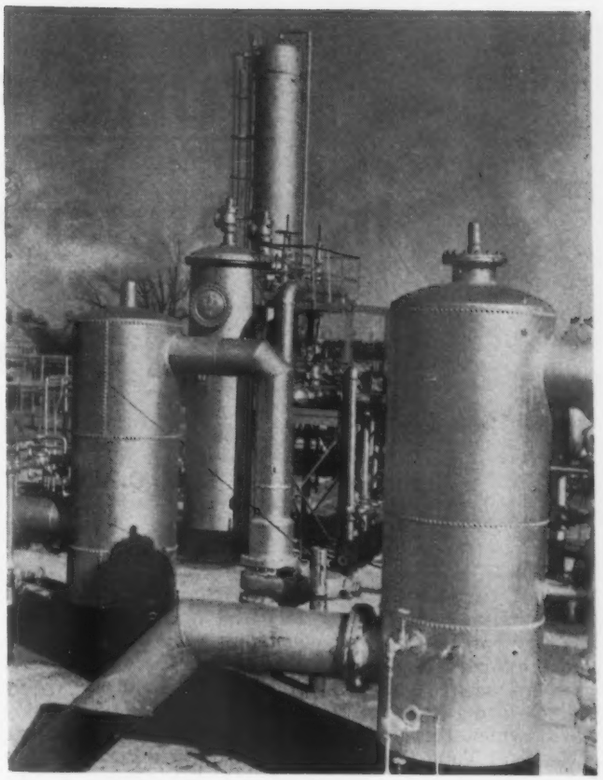


Fig. 5. Gas separators like all other natural gasoline equipment in the southwest is painted with aluminum to reduce inside temperatures

As will be noted, 21,704 of the nearly 25,000 wells in this field are now connected to a gasoline plant. The unconnected wells are in practically all cases edge wells, relatively low in production potential, in many cases making large percentages of water, local engineers say. They are also in most instances so located that connection with a gas gathering system is expensive, too expensive to be economical in view of the amount of gas obtained and the gasoline recovered from it.

Competent engineers acquainted with the situation believe now that, with a very small number of possible exceptions, all well connections for gas which are economically practicable have been made in the field as it exists at present. It may be expected that, as the field grows older, the quantity of gas will become less while its richness in recoverable hydrocarbons will increase. This is in line with general experience in other fields. At the present low rate of production per well in this field, an adequate gas supply years to come, in the opinion of qualified engineers.

Italian Engineers Visiting U. S.

TULSA—A party of three Italian engineers are touring the United States, visiting refining companies and studying wax production methods and processes. They are Dr. Felice Epstein, technical director, Dalla Raffineria di Olii Minerali, S. A., Fiume; Antonio Cavallaro, vice-director of "Anic" interests, Milan, and Prof. Fausser. They are traveling in company with J. M. Wadsworth, sales head for Foster Wheeler Corp. in Italy.

With a supply of crude from Albania, across the Adriatic Sea from Italy, Italian refiners are planning to manufacture the maximum available quantity of paraffin wax from it, according to advice received.

732
734
741.6

TUBE FAILURES

In Refinery Still Tubes, And Their Causes*

By E. C. WRIGHT** and H. HABART***

Abstract

● Alloy steels containing 1-5% chromium sometimes fail from intercrystalline corrosion due to oxidation or corrosion of grain boundaries. This seldom if ever happens with ferritic type steels.

Tubes are not designed normally to operate at stresses high enough to cause intercrystalline *fracture*.

18-8 tubes have on occasion shown failures from intergranular corrosion on the inside, or outside because of intergranular oxidation; these steels very resistant to both actions.

Still tube life has been extended from 2000-10,000 service hours to 30,000-60,000 hours as result of improvement in alloys and in furnace design.

CRACKING STILL TUBES have been used for approximately twenty years since the first cracking coils using high pressure were constructed by C. P. Dubbs during the World War. Originally, cold drawn carbon steel tubes were used exclusively, but these have been largely displaced during the last ten years by a variety of alloy steels of which there are now at least 20 different types. The National Tube Co. made the first cracking still tubes and has been intimately connected with the industry during this whole period. In this interval, hundreds of ruptured still tubes have been examined in our laboratories, and these failures discussed with refinery engineers. This paper consists of a summary of the many metallurgical autopsies which have been performed in the last twenty years. A survey of these investigations show that the failures fall into definite classes.

The earliest work of this nature was done on specimens which had burst wide open for a considerable distance. These failures often occurred after only a few hundred hours of service as compared to a life of several thousand hours, which is now expected of cracking still tubes. The only material then in use was low carbon boiler steel, and the sizes of the tubes were usually estimated from the properties of the steel at room temperature. As no boilers had then been built for temperatures above 600° F., the design of equipment for 850° F. and higher was very largely guesswork.

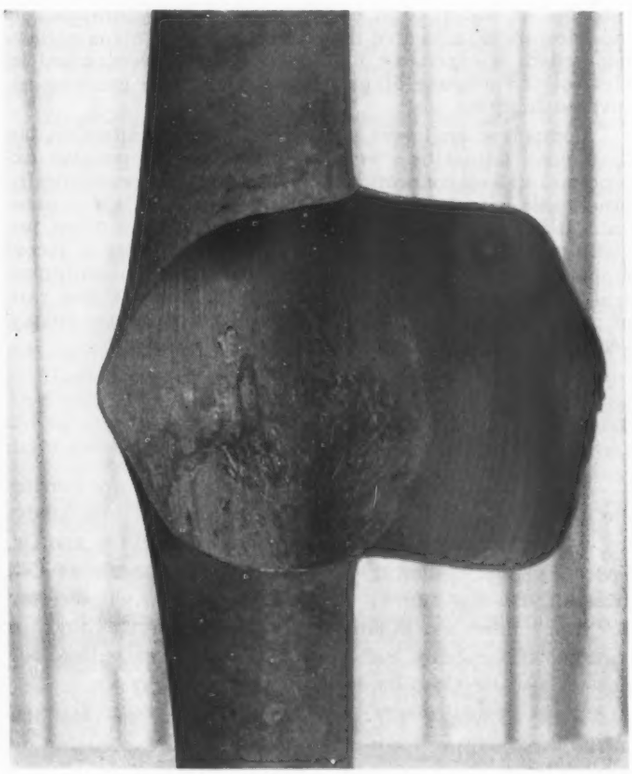


Fig. 1. Failure of early carbon steel tube, after 12 days use

Fig. 1 is a typical example of the type of rupture which was early encountered. The tube had only been in service for 12 days and had apparently been overheated throughout its brief service life. Metallurgical examination of this type of tube invariably develops structures similar to those observed in examination of broken tensile test pieces on tests made on short time high temperature tests. Sections cut from the metal adjacent to the rupture invariably show directional flow lines of work as indicated in Fig. 2, and it is believed that this kind of failure is practically the same thing as the short time high temperature bursting test. A tube will ordinarily expand approximately 25 per cent of its diameter before failing in a bursting test, and the order of expansion on this kind of failure is similar.

Another type of failure, which seems to be largely mechanical, is indicated by that shown in Fig. 3. This represents an original 5-inch O. D. tube which has expanded in a series of bulges along a length of 6 feet. Although this tube did not open up, it is very near the rupture point

*Condensed from paper presented before Western Metals Congress, Los Angeles, Mar. 21-25, 1938, under title "Typical Failures of Still Tubes in Refineries."

** Chief Metallurgist, National Tube Co., Pittsburgh, Pennsylvania.

*** Metallurgist, Ellwood Works, National Tube Company, Ellwood City, Pennsylvania.

at one position, where the outside diameter is 5.722 inches. This condition can be developed either by creep in a long time of service or it has also been produced by severe turbining of the tubes after shut-down when the tubes are too hot. Tests of this feature were actually conducted at one refinery where tubes were heated to different temperatures and then turbined. It was found that at temperatures above 600° F. the turbining of the tubes caused localized bulging, particularly when the turbining tool was left in one position for too long a time.

Serious cases of overheating tube metal are still evident, although this factor is also decreasing from better control of furnace operations. Fig. 4 shows the metal structure adjacent to the rupture of a tube which was heated to a very high temperature. The coarse austenitic grain size of this metal is readily apparent as compared with the structure of the metal from the same tube at a point 180° around the tube from the rupture. Fig. 5 shows the structure at this point and typifies the fine grain metal of the original tube which has undergone little transformation. The investigator never knows whether the structure exhibited in Fig. 4 represents that of the tube before rupture or the structure developed from overheating from the fires which usually results when a still tube blows out.

During the past two or three years there has been considerable discussion of a possibility of failure of metals at high temperatures through intercrystalline cracking, due either to oxidation or corrosion of grain boundaries. In all of these studies, extending over 20 years, only one instance of this type of failure has been encountered in steels of the ferritic type. This includes all of the low carbon, carbon-molybdenum, and alloy steels containing 1 to 5 per cent chromium. The case observed represents a carbon still tube taken from a refinery in West Texas which had been processing in extremely corrosive high sulfur crude. The inside surface of this tube was honeycombed with innumerable intergranular fissures as shown in Fig. 6. Examination of the metal in the microscope exhibited typical structures associated with intergranular corrosion as shown in Fig. 7, taken at 1000 diameters. Intergranular corrosion on the inside of a ferritic steel tube has never been encountered before except where hydrogen gas was present in considerable volume, such as is encountered in ammonia synthesis plants.

Two investigations reported during the past year have raised considerable anxiety among engineers regarding the intergranular failure of ferritic steels when under stress at high temperatures. In all of our studies of boiler tubes, superheater tubes, cracking still tubes, and tubes in high pressure chemical plant service, instances of intergranular failure of ferritic steels have been extremely rare except in the presence of hydrogen. In a paper[3] entitled "Creep and Engineering Design" R. W. Bailey stated, "Appreciable weakening of the steel may occur in time, and evidence shows that probably all low alloy high creep resistant steels fail under creep conditions by intercrystalline cracking with comparatively low ductility." He further stated—". . . . total creep should not exceed 0.005 strain for high creep resistant steels containing molybdenum."

These remarks were apparently based on creep-to-fracture tests made at 1020° F. on a carbon molybdenum steel at the National Physical Laboratory. The stresses employed were 20,000 to 34,000 PSI, a range far above that normally used for this steel in creep testing or in working stresses in equipment design to work at this temperature. When tested at these high stresses at 1020° F., the specimens showed early intergranular failure with comparatively low ductility. The corresponding creep rates were abnormally high (20 per cent to 4000 per cent per 10,000 hours).

Papers by Clark & White[4] and White, Clark, & Wilson[5] present similar examples of intergranular failure in ferritic steels. A sample of S.A.E.—1015 steel tested at 1000° F. at stresses of 12,000, 9000, and 6000 PSI exhibited intercrystalline fractures in periods of 1552 hours, 4788.5

[3] "Creep and Engineering Design," by Mr R. W. Bailey—International Association for Testing Materials in April, 1937.

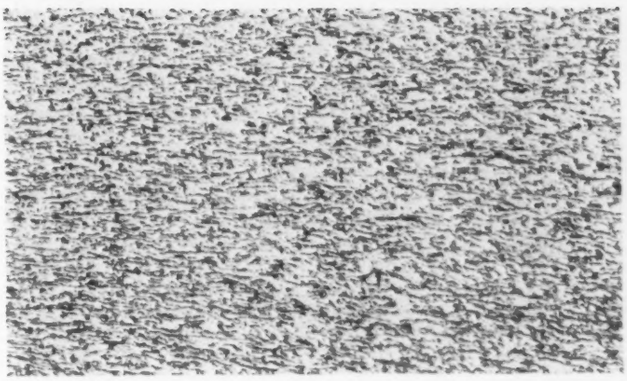
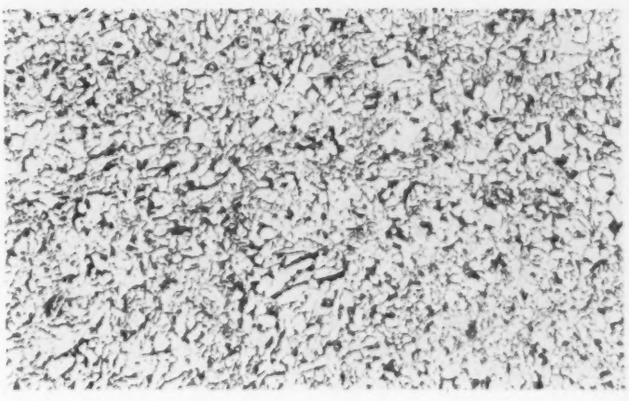


Fig. 2. Photo, at 100X, of early failed tube, showing "work" lines

Fig. 3. Mechanical type of tube failure, possibly caused by cleaning turbine being stopped too long in one place during cleaning



Figs. 4 and 5. Photomicrographs of tube structure which failed at very high temperature

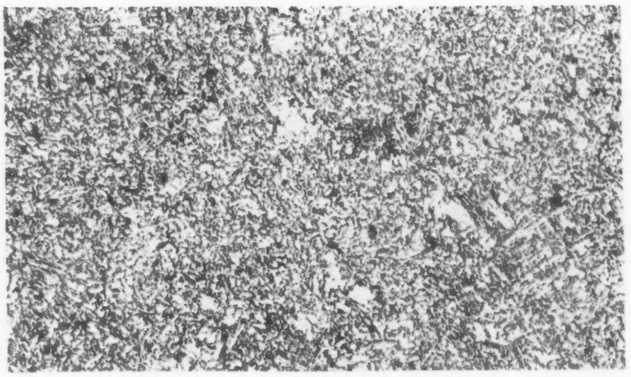


Fig. 6. Intergranular fissures found in tube, illustrating failures due to intercrystalline cracking

Fig. 7. Evidence of intergranular corrosion in tube shown in Fig. 6. (1000X)

Fig. 8. Original structure of tube metal in normalized condition

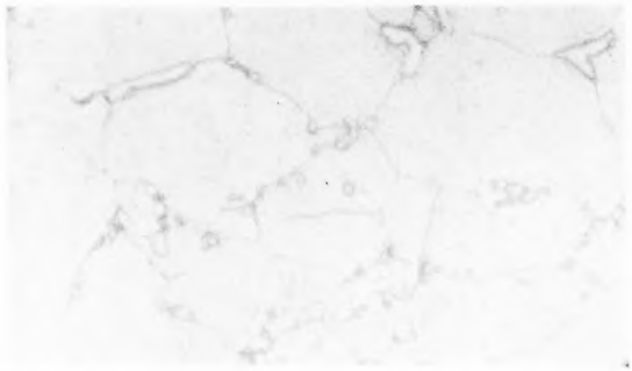


Fig. 9. Spheroidized condition into which the carbides of Fig. 8 are changed under temperature

hours, and 13,950.75 hours respectively. A reasonable creep limit for this steel at 1000° F. is about 3000 PSI for 1 per cent elongation in 10,000 hours (0.1 per cent per 1000 hours) or (.0001 per cent per hour). The loads described in these papers are 4, 3, and 2 times the creep limit. In the case of the 6000 PSI stress, the specimen apparently behaved normally for some 10,000 hours, after which the rate of straining or creep increased enormously.

It is significant that these intercrystalline failures are almost never encountered in ruptured still tubes, even after periods of 30,000 hours. It is also reported that intercrystalline failure does not occur in creep tests where the stress or rate of straining is near the limiting creep load as usually defined. There are no known instances where tubes have been designed to operate at stresses high enough to produce intercrystalline fracture. Even in severe cases of overheating, where the operating temperature is such that rapid rates of straining should occur, the tubes do not fail except by a normal transcrystalline fracture. The evidence that intergranular failure of ferritic steels is common at high stresses is of great importance and points more emphatically to the fact that **stresses chosen for pressure tubes should be such as will produce a low rate of creep.**

The foregoing examples were selected from carbon steel still tubes and give some indication of the wide variety of structures which are developed in these tubes under still tube operating conditions. It will be impossible to indicate all of the peculiar changes which do occur. It has become evident, however, that the original structure of carbon steel gradually and definitely changes to that of an equilibrium state, due to its long time exposure to high temperatures. The original structure of the tube metal is practically always that of the normalized condition, as shown in Fig. 8. Constituents of this structure are ferrite and lamellar pearlite. If the metal is held at temperature, the carbides in the lamellar pearlite gradually coalesce into a globular or spheroidized state as shown in Fig. 9. However, if the time at temperature is long enough, the round carbide particles coalesce into larger carbide particles and finally decompose into graphite. The structure of the original low carbon steel becomes similar to that of malleable iron containing a very small amount of carbon in the form of graphite. Fig. 10, shows small spots of graphite in the carbon steel tube which had been in service for approximately 6000 hours with an observed tube metal temperature of at least 1100° F.

	Yield Point	Tensile Strength	% Elongation in 2 inches
Normalized	30,000	52,000	42.0
Spheroidized	27,000	47,800	40.0
Graphitized	22,000	39,000	21.0

The low carbon steels with ½ per cent and 1 per cent molybdenum are also subject to structural changes almost the same as those observed in plain low carbon steel, although graphite has never yet been encountered in the molybdenum bearing steels. The chromium alloys, containing from 2 to 5 per cent chromium, seem to have much more stable structures, although, even in these materials, some coalescence and enlargement of carbide particles takes place, and some softening of the properties is noted after long periods at high temperatures.

Even more remarkable instances of this graphite formation have been reported by Dr. R. W. Moore of the General Laboratories of the Socony-Vacuum Oil Company. In this case, carbon steel tubes with a service life history of 20,000 to 45,000 hours were investigated. This long service for carbon steel in cracking coils is greatly beyond that reported by any other refinery of the writers' knowledge, as the usual life of a carbon steel tube, depending upon corrosion conditions, seems to be between 2000 and 15,000 hours. In the extremely long service life investigated by Dr. Moore, the presence of graphite in a number of tubes was well established. In this case, the different sections of the same tube, which had apparently operated with a thermal gradient, showed all degrees of spheroidiza-

[4] "Creep Characteristic of Metals"—Transactions A.S.M.E. 1936.
[5] "Rupture Strength of Steels at Elevated Temperatures"—Transactions A.S.M.E. 1937.

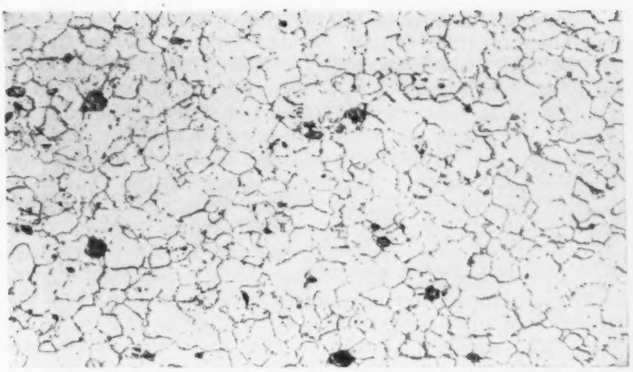


Fig. 10. Small spots of graphite in tube used at 1100° F. for 6000 hours

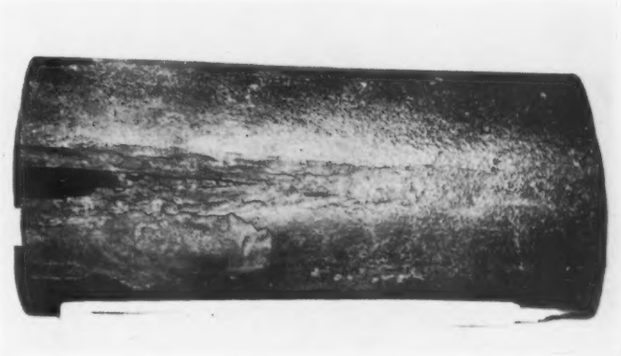
tion to final graphite formation. These data are interesting, in that they show the trend of the structure of the steel in cracking still service.

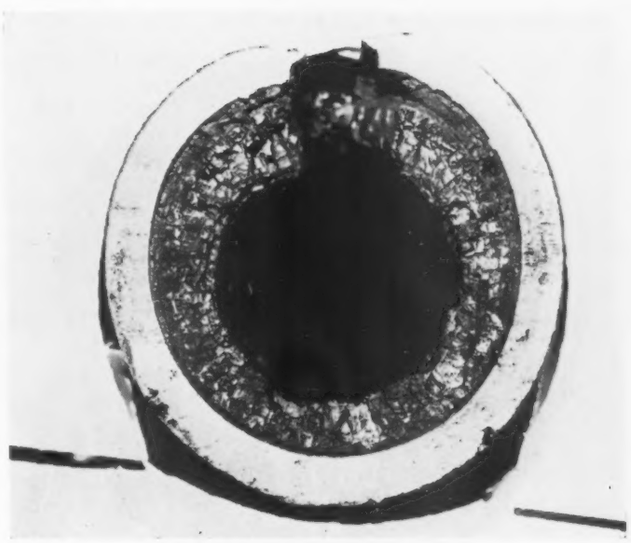
The structural transformations, evident in Figs. 8, 9, and 10, require quite high temperatures, apparently at least 1000° F. The time and temperature seem to be the main contributing causes, and the effect of stress is somewhat negligible. Specimens of steels heated to 1000° F. without stress seem to change in structure very slowly, and it may take several thousand hours to completely spheroidize the original lamellar pearlite at this temperature. The transformation can be promoted much more rapidly at 1100° F. At 1200° F. a complete change to spheroidized carbides can be produced in 100 hours without the application of any stress.

In present day cracking furnaces, the optimum outlet oil temperature is 1050° F., and the metal temperature of the tube must be considerably higher than this, especially in the last row of tubes where the oil stream is hottest. If the tube has any deposit of coke, which has a high insulating effect, the metal temperature of the tube must approach 1150° to 1200°, and at these metal temperatures the stress capacities of the steels are quite low. It is believed that tubes in the outlet section of the coil should be designed to offset this condition either by the use of heavier wall thicknesses or alloys of greater creep strength, and this feature has lately been given consideration.

Fig. 11 shows a more recent rupture of a 5 per cent chromium, ½ per cent molybdenum tube, and is generally typical of the type of failure most commonly encountered now on all forms of cracking still tubes. It will be noted that this tube is heavily scaled, the oxide coating on the outside being at least 1/16-inch thick, and that the scale is permeated with longitudinal fissures or cracks which lead into the metal rupture. It is believed this condition, which is now most frequent in tube failures, represents a combination of oxidation and creep failure. It has been generally noted that such heavily scaled tubes develop cracks in the scale, and the oxidation of the metal in these scale cracks becomes accelerated at the base of the crack. This develops a slight notch, and, as the tube expands slightly due to creep, the notch is opened and deepened by further oxidation. The tube wall usually thins out on one side, which is probably hotter in the still, and the hottest metal creeps to the greatest extent. This is a gradual type of failure, which does not develop into a sudden rupture, and often ends up with just a small pin hole leak or crack sometimes less than one inch long. The expansion of the tube is often less than 10 per cent of the original diameter, and this reduced expansion is believed to be associated with the continual oxidation of the scale notch, which is first produced in the original cracking of the scale. This type of failure is stressed, as during the past five years it has represented most all of the tubes examined. Carbon steel tubes and steels of

Fig. 11. Rupture of a 5% Cr, ½% Mo tube, heavily scaled from oxidation





Figs. 12 and 12-A. Another case of 5% Cr, ½% Mo tube failure, showing little change in wall thickness, and penetration of scale notch into tube wall. Note coke deposit

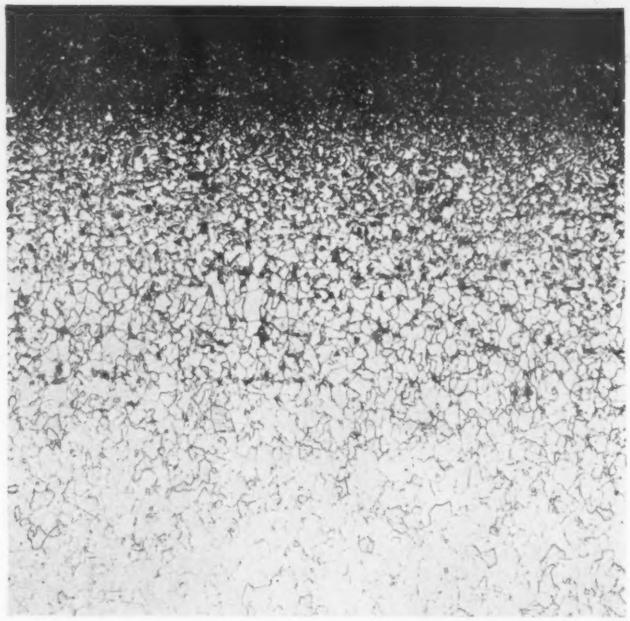


Fig. 13 . Distinct carburization of the tube shown in Figs. 12 and 12-A. Probably heated to 1500° F. or higher in service

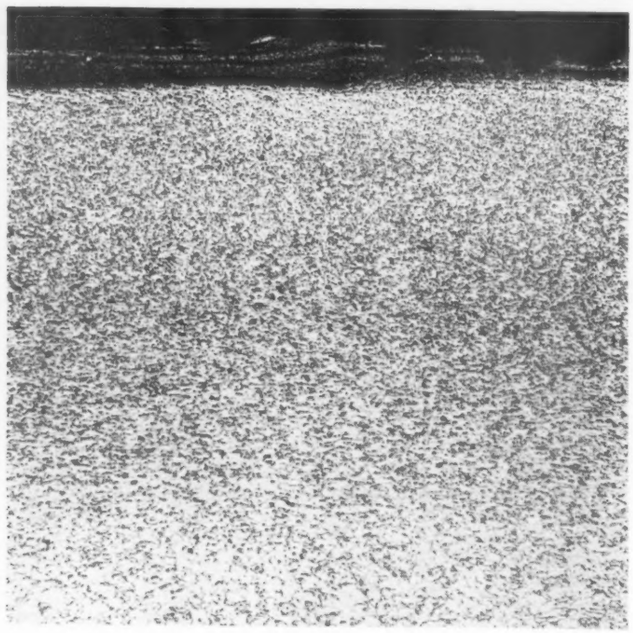


Fig. 14. Refined worked metal structure adjacent to the fracture shown in Figs. 12 and 12-A

Fig. 15. Case of failure due to external intercrystalline oxidation in chrome alloy tube

other compositions also seem to generally fail in a similar manner.

Another instance of a 5 per cent chromium, ½ per cent molybdenum tube failure of this type is shown in Fig. 12 and Fig. 12-A. The upper section shows the wrinkled outside surface and the penetration of the scale notch into the tube wall, while the lower figure, showing the transverse section of the tube, shows how little the tube wall metal has reduced in thickness except at the one spot where outside surface oxidation was accelerated. The thickness of the coke deposit inside the tube is not abnormal even today, and it is evident that many furnace tubes are on stream for too long periods between cleanings. The tube shown in Fig. 17 also exhibits some interesting metal structures, indicated by Fig. 13 and Fig. 14. Fig. 13 shows distinct carburization of the inside surface of the tube, from which it is inferred that the metal was heated in service to at least 1500° under the heavy coke deposit. Fig. 14 shows the refined worked structure of the metal adjacent to the fracture.

One of the most common causes of cracking tube failures is that due to corrosion, and numerous examples of failed tubes, which were badly corroded, have been studied. Unfortunately, tubes, failing from this source, rarely exhibit anything of interest from a metallurgical standpoint, and no photographs of structures of badly corroded tubes are included.

In the case of the 18-8 chromium-nickel alloys, definite instances of corrosive failure have been studied. These tubes under ordinary conditions are largely immune to corrosion on the inside from the oils being processed and also highly resistant to oxidation on the outside. Under certain conditions, such as structure, stress, and temperature, however, the 18-8 alloy has exhibited cases of intergranular failure originating on the inside from intergranular corrosion or on the outside from intergranular oxidation.

A definite case of external intercrystalline oxidation is shown in Fig. 15. This shows the tube surface honeycombed with fine intercrystalline cracks. The lower photomicrograph, or Fig. 16, taken at 1000 diameters is of considerable interest in that it exhibits the metal in the path of the oxidizing gases. The white streak of metal between the two layers of oxide apparently represents the original grain boundary between these crystals, and the oxidation has taken place at the grain boundary surface of the original crystal where the chromium was depleted through carbide precipitation. The theory has long been assumed that, when carbide precipitation occurs in chromium-nickel alloys, the separation of the chromium carbides, which are high in chromium, causes a reduction in chromium content in the grain boundary surface adjacent to the precipitate. This lower chromium content at the grain boundary reduces

(*Continued on page* R-140)

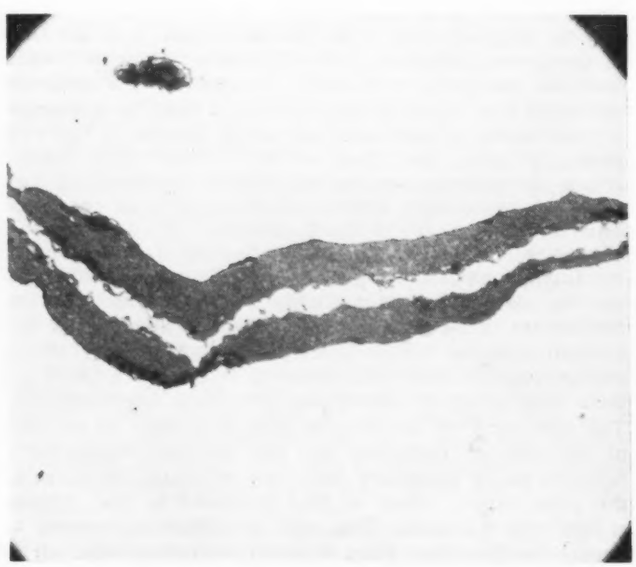
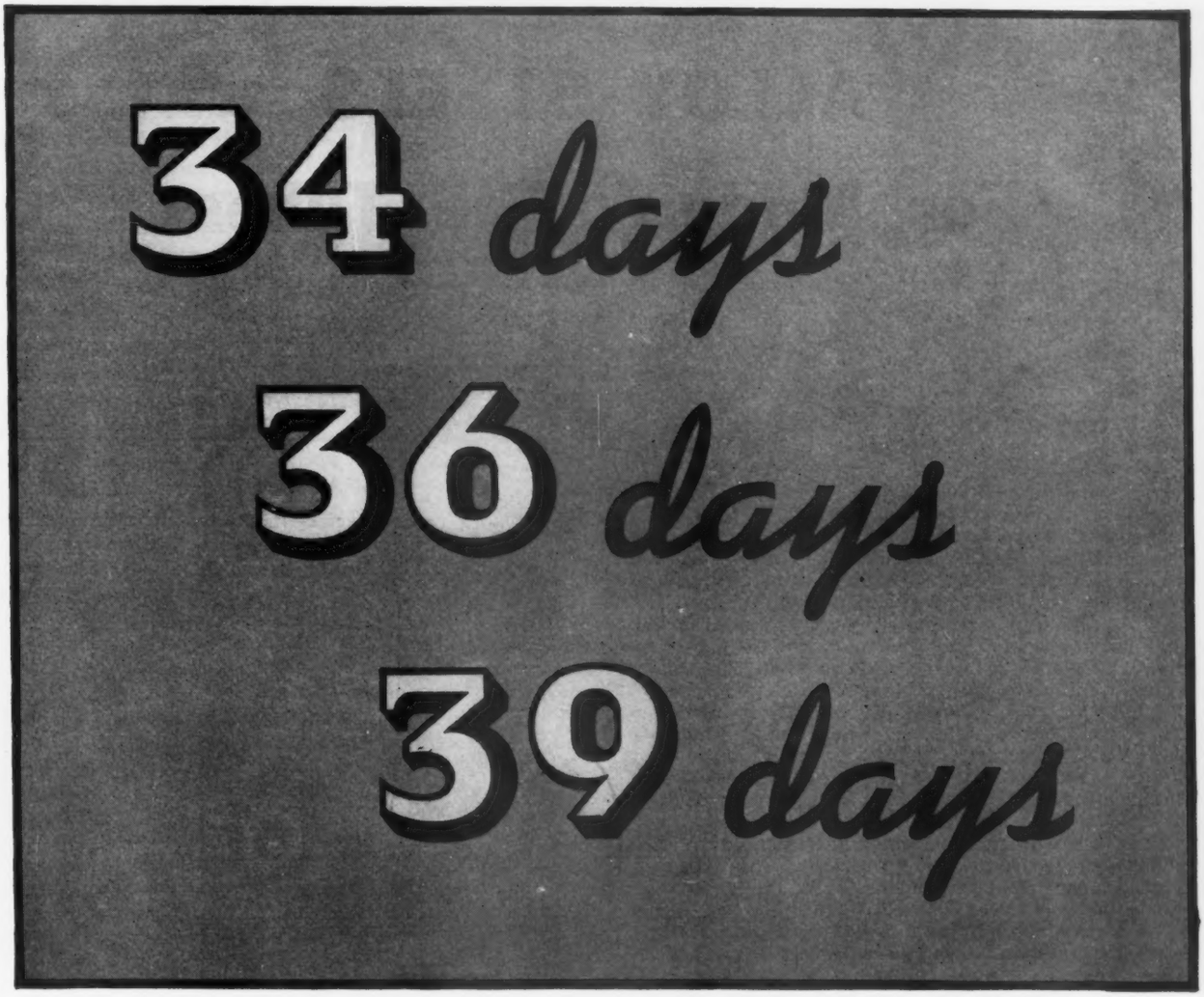


Fig. 16. Section of tube shown in Fig. 15, showing effect on metal in path of oxidizing gases



Of three combination selective cracking units recently completed by The Lummus Company—

- One plant completed 34 days' operation on its initial firing run.
- The second plant ran 36 days on its initial firing.
- The third plant operated 39 days for its first run.

Two of these plants were built, simultaneously, within six months from the date of signing of contracts and both went on to full production of specification gasoline and fuel oil without making a single barrel of off-specification products.

THE LUMMUS COMPANY, 420 LEXINGTON AVENUE, NEW YORK, N. Y. • 411 WEST FIFTH STREET, LOS ANGELES, CAL. • BUSH HOUSE, ALDWYCH, LONDON, W. C. 2

LUMMUS

PETROLEUM REFINING PLANTS

732.
734.
741.6

ALLOY STEELS For Modern Still Tubes*

By R. L. WILSON[1]

Abstract

● This paper describes the comparative effect of the various useful alloying elements on the corrosion, oxidation, high temperature strength, and air-hardening of refinery tube steels. Many of the newer compositions are classified according to their serviceability and the latest creep data are tabulated for some of the types.

Small amounts of chromium, as low as 2 to 2.5%, make extraordinary improvement in corrosion resistance. From that range to 6% the rate of corrosion reduction is nearly linear. Silicon without chromium does not increase corrosion resistance, but is beneficial when accompanying chromium. Silicon reduces oxidation and scaling tendencies.

Oxidation is retarded especially by the addition of titanium, tungsten columbium and aluminum; tungsten especially is added for strength. Titanium and columbium prevent air-hardening of chrome alloys.

A list of 14 new alloys which offer good properties for specific purposes is included here, along with their compositions and special properties, which is a useful list to the refiner.

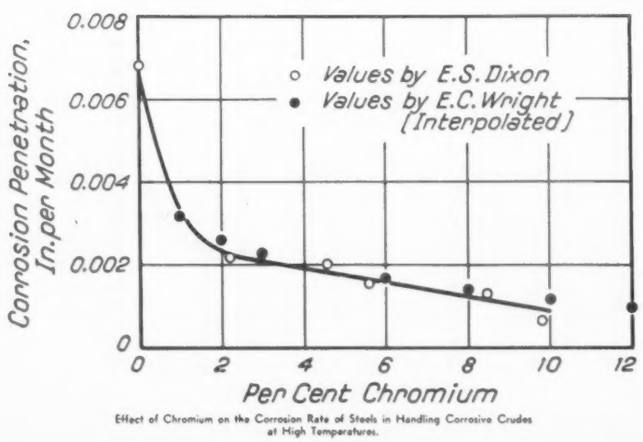
THE continued improvement of alloy steels for tubing in oil heaters is a direct result of developments in the cracking and thermal polymerization processes for making gasoline of high octane rating. The high temperatures prevailing in both types of operations and the high pressures used in the thermal polymerization of hydrocarbon gases have created a need for materials of better strength and oxidation resistance at elevated temperatures. Moreover, the manufacture of standard products by utilizing the available crude oils of a more corrosive nature has introduced new problems in the corrosion of tubing, especially in the case of the cracking processes. Any discussion of the suitability of tube steels for oil refinery service consequently involves consideration of the corrosion, oxidation, and strength of materials.

The steels being offered to meet these new requirements have been evolved from the familiar compositions previously employed in similar applications. They all contain chromium along with various other alloying elements that have been added to secure special properties. The tendency is toward higher chromium content as the operating temperatures and the severity of corrosion increase. Steels are being strengthened by appropriate additions of tungsten, vanadium, and molybdenum; scaling is being reduced by silicon, aluminum, titanium, and columbium; and air-hardening eliminated by titanium, columbium, and aluminum. The regular 18-8 stainless analysis, which possesses extraordinary qualities for service of this kind, has been modified by having molybdenum and columbium incorporated and austenitic chromium-nickel alloys of still higher chromium and nickel content have been listed as commercial steels. Since many compositions of steel can be formed from a few metallic elements, it seems pertinent to consider the effect of the important elements individually on the essential qualities of refinery tube steels before reviewing the merits of the different compositions in detail.

[1]Metallurgical Engineer, Climax Molybdenum Co., Canton, Ohio.

*Presented before Western Metals Congress, Los Angeles, Calif., March 21-25, 1938, under the title, "Alloy Steel Tubing For Oil Heaters".

Figure 1



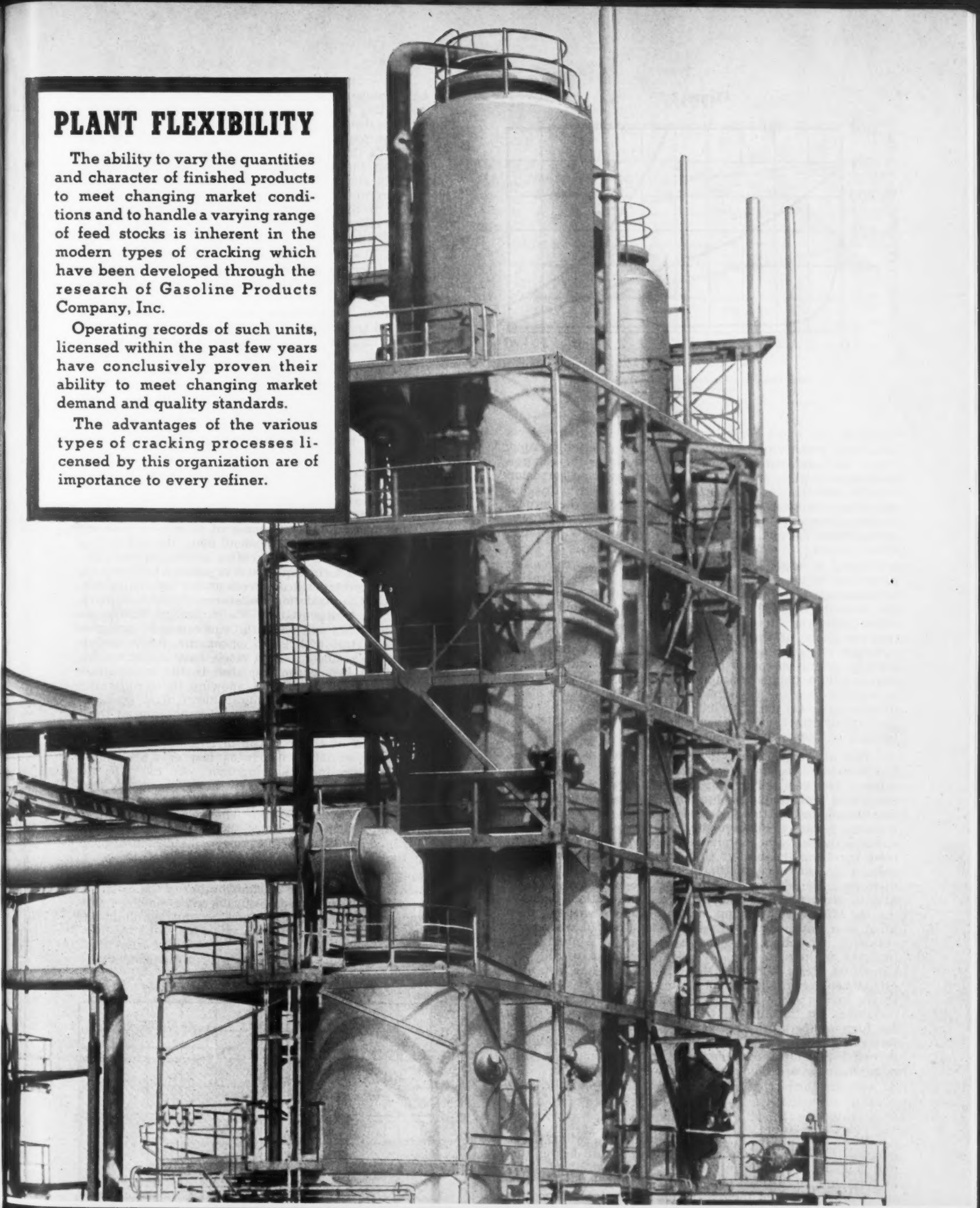
Effect of Chromium on the Corrosion Rate of Steels in Handling Corrosive Crudes at High Temperatures.

Corrosion

The corrosion of steels by hot petroleum products at elevated temperatures takes place by direct chemical reaction of the metal with the corrosive oils. Of all the alloying elements added to steels to reduce corrosion by this form of attack, chromium is the most effective. Even small amounts in plain carbon steels make notable improvements in the corrosion resistance (See Fig. 1). As the cost of the chromium steels is low in comparison with the greatly enhanced resistance to corrosion, a number of chromium alloys, ranging from 1 to 14% or more chromium, have been found economical for a wide variety of uses in the construction of equipment for oil refining.

The development of the chromium alloy steels for oil refinery corrosion may be traced to the early work of E. S. Dixon (1) who was the first to discover the practical importance of low chromium heater tubes as an economical solution to the corrosion problem in processing sour crude oils. In Fig. 1 is the Dixon curve based on the original refinery oil-stream corrosion tests showing the effect of chromium content on the corrosion rate of steels in handling certain corrosive crudes at high temperatures. Along with these data are some values interpolated from a similar curve by E. C. Wright (2) as expressed on the same basis to facilitate comparisons.

The values by Dixon are averages of several test runs and the values by Wright were obtained from a curve rep-



PLANT FLEXIBILITY

The ability to vary the quantities and character of finished products to meet changing market conditions and to handle a varying range of feed stocks is inherent in the modern types of cracking which have been developed through the research of Gasoline Products Company, Inc.

Operating records of such units, licensed within the past few years have conclusively proven their ability to meet changing market demand and quality standards.

The advantages of the various types of cracking processes licensed by this organization are of importance to every refiner.

LICENSES granted under United States and Foreign Patents for: Cross, de Florez, Holmes-Manley, Tube and Tank Cracking Processes, Uni-Coil Injection Process and Combination Cracking Units
Licensing Agents: THE M. W. KELLOGG CO., Jersey City, New Jersey, or its *European Representative*: COMPAGNIE TECHNIQUE des PETROLES, 134 Boulevard Haussmann, Paris, France

GASOLINE PRODUCTS COMPANY

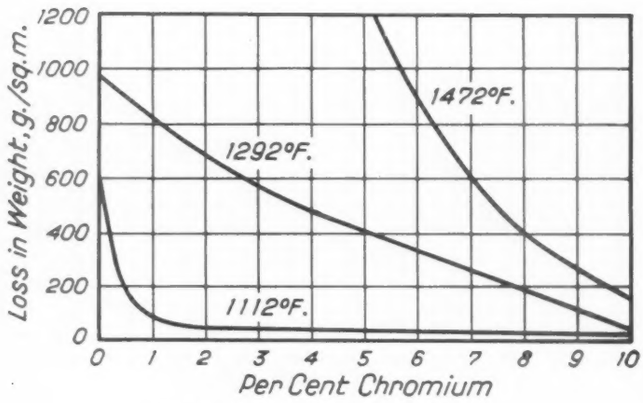
INJECTION UNICOIL PROCESS

INCORPORATED

11 COMMERCE STREET · NEWARK, NEW JERSEY

GASOLINE PRODUCTS INC.

Figure 2



Effect of Chromium on the Scaling of Steels at Different Temperatures. (Jungbluth and Mueller)

resenting the mean corrosion of various chromium steels in a large number of refineries over a long period of time. Fig. 1 may therefore be regarded as showing the relation between chromium in steel and probable average corrosion rate for American refining practices. It is noteworthy that chromium additions up to 2 or 2.5% produce the largest decrease in corrosion for each increment of chromium. Between about 2.5 and 10 or 12% chromium the relation is almost linear.

Years of experience have shown that this composite curve can be used to predict the general hot oil corrosion of chromium steels, and forms the foundation upon which the more highly-alloyed chromium steels are constructed. When using the curve, however, it should be remembered that the shape of the portion representing low chromium contents may change considerably depending upon the severity of the corrosion encountered. Thus where corrosion is mild a steel containing 1 or 2% chromium may last so well as to make the choice of higher chromium steels unnecessary. On the other hand, if corrosion is quite severe the rate of attack may be rapid even for steels containing up to 6 per cent chromium.

Few alloying elements besides chromium contribute to the corrosion resistance of steels for high temperature refinery service. Other chemical elements that have been mentioned are titanium, columbium, silicon, and aluminum. The specific benefit to be derived from the addition of these elements is hard to distinguish, since they are usually added to steels that already contain chromium. Any improvement resulting from the use of titanium and columbium is attributed to their great affinity for carbon, which enables them to displace the chromium from the carbides and so to help in protecting the alloy from corrosive attack by raising the effectual chromium content. Silicon without chromium does not increase corrosion resistance, but when present with chromium may prove beneficial. Aluminum is reported to increase the corrosion resistance of the low chromium steels although this observation has not been established for miscellaneous applications nor is the mechanism known by which the aluminum functions in such instances. In formulating the compositions of tube steels for high temperature service in oil refineries, it is therefore customary to rely upon the chromium to provide the corrosion resistance and the other special elements to furnish whatever additional qualities are required.

Oxidation

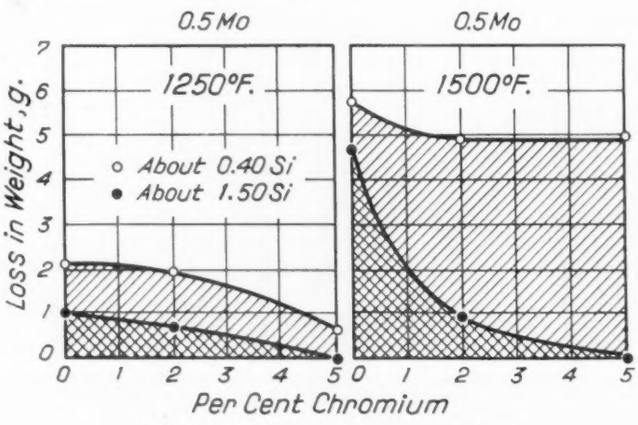
It is interesting to find that chromium, which is so essential to the corrosion-resisting steels for oil heater tubing, is also outstanding in retarding the oxidation of steels at high temperatures. This means that chromium steels selected primarily for their corrosion resistance will possess value in oxidation resistance as well. Fig. 2 shows the effect of chromium on the scaling of steels at 1112°, 1292°, and 1472° F. (3). The curve showing the relation between amount of scaling and chromium content for 1112° F. indicates how comparatively small proportions of chromium aid in protecting steels from oxidation in the intermediate range of operating temperatures. The value of small additions of chromium in these circumstances recalls the similar potency of this element in reducing hot oil corrosion. Of course, as the temperature rises more chromium is required in the steels to keep the rate of scaling low. Steels of higher chromium content than are shown in Fig. 2 will be protected from oxidation at even higher temperatures until finally alloys containing 25 to 30% chromium will resist scaling when heated continuously at temperatures as high as 1800° to 2000° F.

In tubing for oil heater applications it is seldom necessary to employ the expensive high chromium alloy steels solely for their superior oxidation resistance. The high chromium compositions are selected mainly for good corrosion resistance and strength, with the result that the oxidation resistance of these materials is regarded only as an incidental asset. Whenever it might be expedient to develop the oxidation resistance specifically and most economically, the chromium-silicon steels would be preferred to the chromium alloys. For equivalent resistance to oxidation the chromium-silicon alloys are not only cheaper but combine a high degree of resistance to scaling with many desirable mechanical properties of the low alloy pearlitic steels.

Although silicon alone will retard the scaling of simple steels at temperatures up to 1100° F., the full benefit to be derived from the use of this element will not be realized unless the silicon can be used in combination with chromium. Moreover, the effectiveness of silicon in reducing the oxidation of steels is dependent upon the amount of chromium in the steels, being greater the higher the chromium content. As a consequence it is possible to formulate a number of chromium-silicon steels of low total alloy content in which the oxidation resistance is extraordinary. For instance, a steel containing 5% chromium, 0.50% molybdenum, and 1.50% silicon is the equivalent in oxidation resistance of a steel with 2.75% chromium, 0.50% molybdenum, and 2.75% silicon. Both steels have a scaling rate similar to 12 to 14% chromium steel in the temperature range of 100 to 1400° F. Fig. 3, showing the comparative oxidation of several low and high silicon alloy steels at 1250° F. and 1500° F. is a graphical representation of these various features (4). From the curves in Fig. 3 it will be seen that increase of either silicon or chromium singly has not reduced the oxidation nearly as fast as when silicon and chromium are increased together. At 1500° F. the influence of silicon is quite marked; however, at this temperature both the chromium and the silicon appear to be more effective than at 1250° F. The best proportions of chromium and silicon to produce the desired oxidation resistance will be governed by the associated mechanical properties of the steel.

Titanium, columbium, tungsten, and aluminum are the only other elements capable of contributing to the oxidation resistance of steels that need be considered as having immediate commercial importance. Just as the titanium and

Figure 3



Effect of Silicon on the Oxidation of Low Chromium-Molybdenum Steels. (Timken Steel & Tube Division)

columbium additions to the chromium and chromium-molybdenum steels have resulted in improving the corrosion resistance of these alloys moderately, it may also be said that they increase the oxidation resistance to about the same extent. Titanium and columbium are too expensive to be added exclusively for whatever small gain might be registered in oxidation resistance. While the chief use of tungsten in high temperature steels is to increase strength, it should be noted that tungsten has helped the oxidation resistance of the low chromium steels in a minor way. Aluminum is potentially one of the best alloying elements to decrease the scaling of steels, but the unsatisfactory mechanical properties of the high aluminum steels disqualify them for many desirable applications. Aluminum has been used successfully with chromium in cast iron-base alloys for parts operating at elevated temperatures in oxidizing atmospheres. There are as yet no commercial wrought low aluminum alloy steels in which the principal function of aluminum is to protect the steel from scaling. In a modification of the chromium-molybdenum-silicon tube steels, part of the silicon has been replaced by aluminum apparently without significant change in the oxidation resistance. Contrasted with all these elements that decrease the oxidation of steels is molybdenum, which accelerates the rate of oxidation by making steels scale more freely.

Strength

Creep strength, meaning the unit stress that will produce creep at some specified rate, is the measure of strength generally employed in the design of equipment for high-temperature service. The long-time strength as determined in tensile rupture tests is also satisfactory in evaluating steels for certain applications, although data of this kind have not been used extensively as yet in the design of apparatus and the effect of many alloying elements on the rupture strength is still unknown. The effect of the different special elements used in tube steels for high-temperature service can therefore be examined best at the present time on the basis of the creep strength.

Carbon, manganese, chromium, tungsten, molybdenum, vanadium, and columbium have been reported to increase the creep strength of steels. From the information now available silicon, aluminum, and titanium appear to reduce the creep strength at least over certain temperature ranges. Nickel, when added to low alloy pearlitic steels does not increase the creep strength, but when the addition of nickel to the ferritic chromium stainless steels causes them to become austenitic it may be said that nickel has been responsible for a quite substantial increase in strength.

Carbon raises the strength of steels mainly at temperatures below the equi-cohesive temperature. In a limited range of higher temperatures it can aid in strengthening steels if proper heat treatments are employed to stabilize the microstructure for the service intended. The broadest range of manganese covered in studying the effect of this element happened to be in a series of low-molybdenum steels that were normalized and tempered to confer high strength in the temperature range of 850° to 1000° F. (5). In these tests the addition of 1.25% manganese to a steel containing 0.15% carbon and 0.25% molybdenum produced the highest creep strength for the conditions given. Higher manganese contents up to 3% lowered the creep strength by different amounts. However, it may be said that manganese contributed little to the creep strength of steels at 1000° F. or higher temperatures, particularly when the steels are used in the annealed condition.

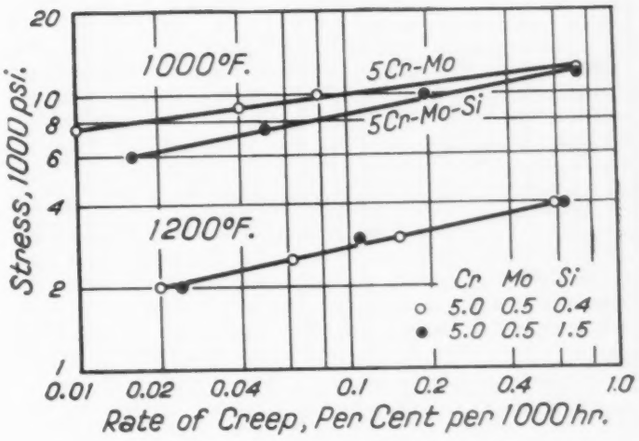
Figure 4

Chromium-Molybdenum Steels

Composition	Creep Strength 0.01% per 1000 hr.			Relative Oxidation 1200°F.
	1000°F.	1100°F.	1200°F.	
Carbon	2150	—	—	100
Carbon-0.5 Mo	5200	—	—	115
2 Cr - 0.5 Mo	6300	3325	1075	50
3 Cr - 0.9 Mo	7000	4200	—	35
5 Cr - 0.5 Mo	7200	2400	900	25
9 Cr - 1.15 Mo	8500	3775	1600	10

Creep Strength of Various Chromium-Molybdenum Steels.
(The Babcock & Wilcox Tube Company)

Figure 5



Creep of 5 Cr-Mo and 5 Cr-Mo-Si Steels at 1000 and 1200 Degrees Fahr.
(Timken Steel & Tube Division)

Chromium increases the creep strength of steels in an irregular manner. In tests conducted at 1000 to 1100° F. on steels containing 0.50% molybdenum, the creep strength became greatest for a chromium content between 1 and 2% depending upon the remainder of the composition. For 1% molybdenum in chromium-molybdenum steels the highest creep strength in this same temperature range corresponds to a chromium content of 2 to 3%. Molybdenum increases the creep strength of all steels to which it is added. The greatest benefits in using molybdenum come from the addition of comparatively small quantities, for while the creep strength rises continuously with increasing molybdenum content, the gains in strength become progressively smaller with each increment in molybdenum. Recent work has also shown that the steels of higher molybdenum content maintain their strength better at the higher temperatures in the range of 1000° to 1200° F. These facts about the effect of chromium and molybdenum on the creep strength of steels can be gathered from Fig. 4 by comparing the data for the various compositions at the different temperatures (6).

Silicon decreases the creep strength of steels for slow rates of creep at temperatures around 1000° F. For faster rates of creep at 1000° F. and slow rates of creep at 1200° F., the addition of silicon does not seem to have much effect on the creep strength. This behavior suggests that the higher silicon produces an increase in viscosity of the intergranular metal thus permitting transfer of stress to the stronger crystalline grains. Fig. 5 shows the effect of silicon on the creep of a 5% chromium-0.50% molybdenum steel (7). The same observations were made in the case of a carbon-0.50% molybdenum steel.

Non-Hardening

The great affinity of titanium and columbium for carbon led to the use of these elements in stabilizing the 18-8 stainless steel to prevent the intergranular precipitation of carbide particles and to reduce the susceptibility of the alloy to corrosion attack in the grain boundaries. Both titanium and columbium carbide have low solubility in austenite so that welding may be carried out on the high chromium-nickel stainless alloys without danger of carbide precipitation in the heat affected zones alongside the weld seams.

Besides this very important use of titanium and columbium, these elements are being added to the pearlitic chromium alloy steels of the air-hardening type to make them non-hardening and thus more amenable to simplified

technique in field welding operations. When the proper ratio of titanium or columbium to carbon content is maintained, the steels exhibit many of the characteristics of the chromium irons. As the name implies the non-hardening steels may be heated to quite high temperatures and air-cooled without hardening. Rods of 5% chromium-molybdenum-columbium steel are on the market for welding the low chromium refinery steels. Austenitic stainless welding rods may also be used in circumferential welds on the non-hardening steels where expansion of weld metal is not restricted. The non-hardening chromium steels are especially well suited to flash welding as the welds are less liable to develop stress cracks. Air-cooled flash welds may show high hardness in the weld junction since the metal gets hot enough locally during the welding to dissolve the carbide and make the alloy hardenable. Such welds should be softened by tempering if the rate of cooling has been rapid enough to cause hardening.

Aluminum can likewise be used to regulate the air-hardening of the low alloy steels. It has already been tried for this purpose in the 5% chromium and 12% chromium types. Just how the aluminum acts in these cases is not known but the effect is much the same as when titanium and columbium are employed.

Alloy Combinations

The desire to combine in one steel a number of properties conferred by different alloying elements has led to the introduction of complex alloy steels containing several special elements. In these combinations it may be said that each alloying element contributes to the properties of the steel the particular qualities with which it has been identified. The objective in building an alloy composition may vary greatly depending upon the use of the material. Alloy steels for the construction of high temperature equipment all have to possess strength, corrosion resistance, oxidation resistance, toughness, or stability in some degrees. Consequently a great many compositions have been suggested to satisfy the demands of the oil refining industry for inexpensive steels suitable for a wide variety of applications. Thus the plain low chromium steels have been replaced by the chromium-molybdenum steels to minimize temper brittleness, silicon has been added to the chromium-molybdenum steels to improve the oxidation resistance and the chromium-molybdenum steels have been made non-hardening with columbium.

Experiments have shown that the effectiveness of any element in raising the creep strength of a steel becomes less as the amount of the additions is increased. At the economical limit in the use of a single element, it may be advantageous to strengthen the steel further by making a small addition of another suitable alloying element. There are thus two ways by which the strength of a steel can be increased through the agency of alloying. The first consists in adding larger amounts of one particular element; the second employs the device of using the proper small quantities of two or more special elements. Increasing molybdenum content in the chromium-molybdenum steels to obtain greater strength at higher temperatures is an example of the first method. The second method has given rise to such alloy combinations as the chromium-tungsten-vanadium, chromium-tungsten-molybdenum, and the chromium-molybdenum-vanadium steels. The series of chromium-molybdenum steels, which were developed primarily for graduated corrosion resistance, offers an interesting case of how two alloying elements can be increased simultaneously to good purpose. When molybdenum is increased to raise the creep strength of the steel, the rate of oxidation is likewise increased. However, if the chromium and molybdenum are increased together, the strength of the alloy can be raised without loss in scale resistance. This may be seen by comparing the strength and oxidation resistance of the steels shown in Fig. 4.

Stability of microstructure is gauged by absence of precipitation and agglomeration of carbide. The term has greatest significance in describing the behavior of the austenitic stainless steels. The original 18-8 stainless alloy was stabilized satisfactorily for many applications at temperatures below 850° F. by water quenching from a high temperature. But when the steel might have to operate in the temperature range most favorable to serious carbide precipitation it became necessary to stabilize the alloy by changes in chemical composition. To accomplish this, the chromium and nickel have been raised in some modified analyses to offset the loss of chromium fixed in carbide. An alternate scheme was to add titanium, columbium, and molybdenum to combine with the carbon preferentially and leave the chromium in solution. These modifications of chemical composition were responsible for the 25% chromium-20% nickel, 18-8 with columbium, and other alloys.

Newer Alloy Steels

In a discussion of the newer alloy steels it is always necessary to distinguish between the steels that have actually been used in equipment or have been tested under commercial operating conditions, and those compositions that seem applicable to certain kinds of service on the basis of laboratory tests or the similarity of the steels to other analyses for which satisfactory service records are available.

Among the steels introduced recently, the following may be considered as having been proven either in commercial service or after sufficient testing under plant conditions:

Carbon-0.50 molybdenum with 1.50 silicon, to replace plain carbon steel for better strength and oxidation resistance up to 1100° F.

2.25 chromium-1.00 molybdenum, for good strength up to 1100-1200° F., where corrosion and oxidation are not severe.

5 chromium-0.50 molybdenum-1.50 silicon, combines excellent oxidation resistance and good resistance to hot oil corrosion.

5 chromium-0.50 molybdenum-titanium, non-hardening steel suitable for field welding, possesses better oxidation resistance than the standard 5 chromium-molybdenum steel.

9 chromium-1.15 molybdenum, and semi-stainless steel especially good for corrosion resistance, also shows good creep strength.

12 chromium-3 tungsten, good strength, corrosion and oxidation resistance for service at high temperatures.

18 chromium-8 nickel-titanium, stabilized austenitic stainless alloy with excellent strength, corrosion and oxidation resistance.

16 chromium-13 nickel-3 molybdenum, adapted from the sulphite paper industry because it showed better strength and corrosion resistance than regular 18-8 stainless.

25 chromium-20 nickel, austenitic stainless alloy suitable for service requiring extreme oxidation resistance and strength at temperatures up to 1800° F.

In the class of promising alloy steels for which the commercial service data are as yet incomplete, the following may be mentioned:

Steels containing 2.50 to 4.50 mean chromium with molybdenum and vanadium, used successfully for several years in the chemical industry, presumably has better strength than the corresponding chromium-molybdenum steels.

Steels containing 3.00 to 5.00 mean chromium with molybdenum, silicon, and aluminum, exhibit better corrosion and oxidation resistance than regular 5 chromium-molybdenum steel.

5 chromium-0.50 molybdenum-columbium, improved non-hardening steel with good impact strength under all conditions of testing.

16-13-3 with columbium, prospective welding grade of the austenitic chromium-nickel-molybdenum stainless alloy.

18-8 with columbium, stabilized stainless alloy suitable for welding without danger of carbide precipitation.

The chemical compositions and creep strength data for these various alloy steels are given in Tables 1 and 2

Table 1

Chemical Compositions

Steel	Chromium	Molybdenum	Silicon	Nickel	W—V—Ti—Cb.
1	.....	0.45-0.65	0.25 max.	.....	.....
2	.....	0.45-0.65	1.15-1.65	.....	.....
3	1.00-1.50	0.45-0.65	0.50-1.00	.....	.....
4	1.75-2.25	0.45-0.65	0.50 max.	.....	.....
5	1.75-2.25	0.45-0.65	1.00-1.40	.....	.....
6	2.00-2.50	0.90-1.10	0.50 max.	.....	.....
7	2.50-3.00	0.45-0.65	0.50 max.	.....	Vanadium 0.20-0.25
8	2.75-3.25	0.45-0.65	1.00-1.40	.....	.....
9	2.75-3.25	0.80-1.00	0.50 max.	.....	.....
10	4.25-5.00	0.45-0.65	0.50 max.	.....	Vanadium 0.20-0.25
11	4.00-6.00	0.45-0.65	0.50 max.	.....	.....
12	4.00-6.00	0.45-0.65	1.00-2.00	.....	.....
13	4.00-6.00	0.45-0.65	0.50 max.	.....	Titanium—5 times C.
14	4.00-6.00	0.45-0.65	0.50 max.	.....	Columbium—9 times C.
15	8.00-10.00	1.00-1.25	0.50 max.	.....	.....
16	12.00 mean	.....	0.50 max.	.....	Tungsten—3.00 mean
17	15.50-17.00	2.50-3.25	0.60 max.	12.50-14.50	.....
18	17.00-19.00	.....	0.75 max.	8.00-10.50	.....
19	17.00-19.00	.....	0.75 max.	8.00-10.50	Titanium—5 times C.
20	17.00-19.00	.....	0.75 max.	8.00-10.50	Columbium—9 times C.
21	24.00-26.00	.....	0.75 max	19.00-21.00	.....

All are low carbon steels containing nominal amounts of Mn, P. & S.

together with the similar information on a few standard steels for reference.

Selection of Steels

The selection of steels for oil heater tubing should be based upon taking care of corrosion first. This seems essential because corrosion resistance alone may be the deciding factor in the choice of a steel under circumstances that do not involve the oxidation resistance or strength of the steels. In fact, the most serious corrosion is unusually encountered below the scaling point of steels in the temperature range where the strength of most low alloy steels is adequate. Table 1, in which the compositions are arranged in order of increasing chromium content, may therefore be taken as a guide in selecting alloys to combat corrosion by hot petroleum.

Once the corrosion requirements are satisfied the next consideration is resistance to oxidation. As operating temperatures are raised it becomes necessary to protect the steel in some manner from oxidation. This may be done by controlling furnace atmosphere, or by surface treatment of the steel, but in many cases the composition of the steel must be selected so as to provide inherent resistance to scaling. Since several different compositions of steel may have equivalent oxidation resistance, the choice will depend upon the relative strength and price. In Table 1 all the steels containing 5% or more chromium even with low silicon content will show noteworthy oxidation resistance, while the steels containing 3% or more chromium with 1% or more silicon will have remarkably high resistance to oxidation.

It has been customary to represent the limitations of a steel in high-temperature strength by showing at what temperatures the permissible stress values fall quite low for rates of creep of 1% in 100,000 hours and 1% in 10,000 hours when creep strength is plotted against temperature. This procedure will show the definite superiority of one steel over another and will give numerical values for calculating designs but it is not easy to tell from such graphs the limiting service temperature for using a particular material under a given stress. J. J. Kanter has advocated that creep data on steels should be obtained by observing the creep of steels at several different temperatures for the same stresses of 30,000, 10,000, 3000 psi. In Fig. 6 are curves taken from the work of Kanter showing the creep of low carbon steel, 5 chromium-0.50 molybdenum, and 18-8 stainless at different temperatures for a unit stress of 3000 pounds (7). The

Especially Recommended

for use in the

COPPER SWEETENING PROCESS

•

NICHOLS

TRIANGLE BRAND

COPPER SULPHATE

is preferred by leading refineries because of its high copper content, dependable uniformity and exceptional purity and freedom from foreign or inert matter.

99% Pure

Quotation on request, on any quantity required. Prompt shipments can be made from our nearest plant.

NICHOLS COPPER CO.

(Unit of the Phelps Dodge Corporation)

40 Wall Street, New York—230 No. Michigan Ave., Chicago

Table 2
Creep Strength Data
Stress for Creep at Rate 1% in 100,000 Hr. (0.01% in 1000 Hr.)

Steel	1,000°F.	1,100°F.	1,200°F.	1,300°F.	1,350°F.	1,400°F.	1,500°F.
1	5,200	.....	.....	....	....	....	....
2	5,000	.....	720	....	....	....	....
3	13,000	4,300	1,950	....	....	....	....
4	6,300	3,325	1,075	....	....	....	....
6	.....	4,910	2,510	....	....	....	....
9	7,000	4,200	.....	....	....	....	....
11	7,200	2,400	900	....	....	....	....
12	5,450	2,600	1,600	....	....	....	....
15	8,500	3,775	1,600	....	....	....	....
17	14,800	.....	5,000	....	2,500	....	930
18	10,700	7,900	4,300	....	.....	....	1,400
21	.....	.....	5,400	....	2,800	....	800

Stress for Creep at Rate 1% in 10,000 Hr. (0.10% in 1000 Hr.)

Steel	1,000°F.	1,100°F.	1,200°F.	1,300°F.	1,350°F.	1,400°F.	1,500°F.
1	12,400	.....	.....	....	....	....	....
2	9,200	.....	1,850	....	....	....	....
3	22,000	6,800	3,950	....	....	....	....
4	11,000	5,875	3,400	....	....	....	....
6	.....	9,200	4,175	....	....	....	....
9	10,500	9,000	4,000	....	....	....	....
11	9,200	4,800	1,800	....	....	....	....
12	8,700	4,800	2,900	....	....	....	....
14	12,400	.....	2,500	....	....	600	....
15	12,000	6,950	2,300	.....	.....	.....	....
16	24,000	11,000	5,000	2,500	.....	1,500	.....
17	22,800	.....	8,200	....	4,200	.....	1,840
18	18,000	13,000	8,000	....	.....	....	2,500
21	.....	.....	7,400	....	3,300	....	1,100

Data on Steels 1, 4, 6, 9, 11, 15, 17, and 21 from The Babcock & Wilcox Tube Co.
Data on Steels 2, 3, 12, and 18 from The Timken Steel & Tube Division.
Steel 14—Electro Metallurgical Company. Steel 16—Allegheny Steel Company.
Pearlitic steels were annealed, austenitic alloys cooled quickly.

limiting service temperatures are apparent. This suggested the delineation attempted in Fig. 7, which is a tabulation of important alloy steels arranged in order of increasing strength for maximum service temperatures as governed by the allowable rate of oxidation. Data for the listing of the steels were drawn from many sources. All the steels had been subjected to oxidation tests and only two steels, the 2 Cr-0.50 Mo-1.25 Si, and the 18 Cr-8 Ni-Cb, had not been studied in some form of long-time strength test. These two steels were inserted where they seemed to belong.

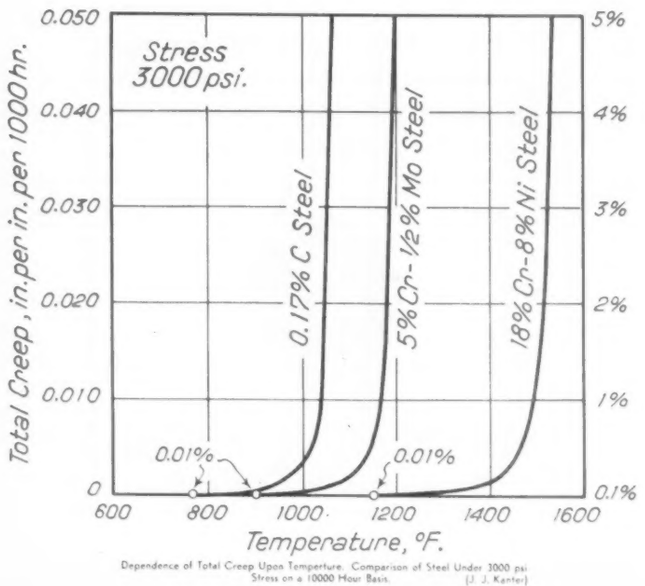
Conclusion

The selection of steels was discussed without emphasis on the cost of materials. Obviously it would be unsound engineering to choose materials without proper regard for cost. On the contrary, no two steels are likely to be nearly identical in several valuable properties and at the same time differ greatly in price. Hence economy in the choice of steels consists largely in knowing the requirements of the application and not paying for qualities that are superfluous.

Very probably there will continue to be a large number of alloy combinations tried in an effort to produce cheaper steels having good general properties for high temperature oil refinery service. A smaller number of special analyses will be developed to solve particular problems in the industry. Confusion as to the merits of the various similar or interchangeable compositions of steel will increase for a while, but in the end the number of alloy steels will be reduced through standardization and only the fundamentally useful analyses will survive.

* * *

Figure 6



Dependence of Total Creep Upon Temperture. Comparison of Steel Under 3000 psi Stress on a 10000 Hour Basis. (J. J. Kanter)

Figure 7

Steels for High Temperatures

Max. Temperatures	Order of Increasing Strength →
1800°F.	25Cr,20Ni
1500	18Cr,8Ni 18Cr,8Ni,Cb 16Cr,13Ni,3Mo
1400	12Cr,3W
1350	5Cr,0.5Mo,1.5Si
1300	3Cr,0.5Mo,1.25Si 5Cr,0.5Mo,Ti 5Cr,0.5Mo,Cb
1250	9Cr,1.15Mo
1200	2Cr,0.5Mo,1.25Si 5Cr,0.5Mo
1100	1.5Si,0.5Mo 2Cr,0.5Mo 3Cr,0.9Mo 2.25Cr,1Mo
1050	1.25Cr,0.5Mo,0.75Si
1000	Carbon Carbon,0.5Mo

Applications of Steels Based on Oxidation Resistance and Strength at the Indicated Maximum Temperatures.

REFERENCES

(1) E. S. Dixon, Article in The Book of Stainless Steels, Second Edition, p. 584.

(2) E. C. Wright, Article in The Book of Stainless Steels, Second Edition, p. 240.

(3) H. Jungbluth and H. Mueller, "Heat and Corrosion Resistant Steels for Steam Boiler Construction," Kruppsche Monatshefte, Vol. 28, 1931, p. 179-188.

(4) Data from Technical Bulletin No. 10, Timken Steel & Tube Division, Timken Roller Bearing Company.

(5) A. E. White, C. L. Clark, and R. L. Wilson, "Factors Influencing the Creep of Steels at Elevated Temperature," Oil and Gas Journal, Aug. 9, 1934, Table 2.

(6) Strength data from Technical Bulletin No. 3-B, 1936, The Babcock and Wilcox Tube Company.

(7) J. J. Kanter, "Interpretation and Use of Creep Results," Transactions, American Society for Metals, Vol. 24, 1936, p. 904.

Electrolytic Plumbate Process For Treating Gasoline Described

By ALLEN S. JAMES
N. P. N. Staff Writer

KILGORE, Texas—The comparatively new electrolytic regenerative process for treating cracked gasoline was described in detail to plant operators who attended the regular monthly technical meeting of the La.-Ark.-E. Tex. division of the Western Petroleum Refiners Assn., held here March 11.

S. C. Smith, now chief chemist for the Paluxy Asphalt Co., Talco, Texas, who was associated with the developers of the process during much of the experimental work, presented the description. The method, he said, is now covered by Patent No. 2,053,909 which has been assigned to F. C. Gardner.

Sodium ortho-plumbate, a compound highly reactive as an oxidizing agent but very unstable, is used as the treating agent. Electrical energy is utilized in the process to convert the original slower reacting treating solution of sodium plumbite through oxidation into sodium ortho-plumbate and then to renew the partially spent solution after each contact with the raw caustic-washed gasoline.

The speaker used as the basis of his description one of the two semi-commercial units that have been built. The physical apparatus, Smith said, consists of a direct connected motor-generator set, a cell box, a settling tank and a mixing coil. The motor operates a 300 ampere direct-current generator, which provides sufficient current for treating 600 to 800 barrels of gasoline daily.

Smith said the cell box can be made of iron, lead, copper or some other suitable metal, but that copper had given the highest efficiency.

The current from the generator is led directly to the cell box which is the anode in the electrical circuit. Within the cell box the analyte is the treating solution of sodium plumbite containing about 15 grams per liter of lead.

In the cell box also are multiple cathode plates in porous clay jars. The catholyte within the jars is caustic soda of approximately the gravity of the treating solution.

Before treating is started, the sodium plumbite solution is circulated through the cell box with the generator running until the oxidation of the solution has been sufficient to raise the plumbate value to about 2 grams per liter.

Treating is then started, with the raw caustic-washed gasoline being pumped with the solution through the mixing coil, made up of six, 4-inch Duriron mixing nozzles, into the settling tank. The sweet gasoline is pumped to storage and the partially spent solution is returned through the cell box for regeneration of the sodium ortho-plumbate.

After treating has started the unit is virtually automatic and requires only the occasional addition of water to the cathode chambers. Chemically speaking, nothing is lost except the hydrogen which is evolved at the cathodes during the regeneration of the partially spent sodium ortho-plumbate solution.

The rapidity of the sweetening operation, Smith said, is amazing. The mercaptans are converted to di-sulfides by oxidation in only a fraction of the time required even when meta-plumbate is used.

Abstract

● Sodium plumbite is oxidized to ortho-plumbate electrolytically, and used to sweeten gasoline without addition of sulfur. Author claims octane number not affected, while lead susceptibility is increased because of reduction in total sulfur present.

Treating solution is oxidized in a metal cell box which is the anode, using direct current from a 300-ampere d.-c. generator, giving capacity sufficient to treat 600 to 800 barrels of distillate per day.

"Mercaptans are usually changed to the unobjectionable disulfides by the use of sodium plumbite, commonly called 'doctor solution' and sulfur according to the following equation:

$$\left.\begin{matrix}RSH & Na\\ RSH & Na\end{matrix}\right\} PbO_2 = \left\{\begin{matrix}RS\\ RS\end{matrix}\right. \Big\{ Pb + 2NaOH$$

$$\left.\begin{matrix}RS\\ RS\end{matrix}\right\} Pb + S = 2\,RS + PbS$$

"Another method . . . is based on reactions of sodium meta-plumbiate which may be represented:

$$\left.\begin{matrix}RSH & Na\\ RSH & Na\end{matrix}\right\} PbO3 = 2\,RS + Na_2PbO_2 + H_2O$$

$$\left.\begin{matrix}RSH & Na\\ RSH & Na\end{matrix}\right\} PbO_2 = \left\{\begin{matrix}RS\\ RS\end{matrix}\right. \Big\{ Pb + 2NaOH$$

$$\left.\begin{matrix}RS\\ RS\end{matrix}\right\} Pb + S = 2RS + PbS$$

"The reaction between sodium ortho-plumbate and mercaptans may be represented:

$$\left.\begin{matrix}RSH & Na\\ & Na\\ RSH & Na\\ & Na\end{matrix}\right\} PbO_4 = 2RS + Na_2PbO_2 + 2NaOH$$

$$\left.\begin{matrix}RSH & Na\\ RSH & Na\end{matrix}\right\} PbO_2 = \left\{\begin{matrix}RS\\ RS\end{matrix}\right. \Big\{ Pb + 2NaOH$$

$$\left.\begin{matrix}RS\\ RS\end{matrix}\right\} Pb + S = 2RS + PbS$$

In addition to the simplicity of the unit, Smith said it had also the feature of economy. He cited as one example the actual current consumption when treating East Texas

cracked gasoline, of 0.024 kilowatts per barrel. The current consumption when treating Smackover cracked gasoline, processes in a Cross unit, was 0.071 kilowatts per barrel.

The plant operators kept Smith busy answering questions for a considerable time after he had finished reading his prepared paper.

One of the first questions was the effect of the treating method on the octane value of the gasoline. Smith said there was no change in octane value since the entire operation was enclosed and there was no possibility for vapors to escape. He also explained that there was no rise in temperature when the gasoline was mixed with the sodium ortho-plumbate solution.

No sulfur is used in the process and there is no chance of corrosive gasoline and the lead susceptibility is greatly increased, Smith answered in response to another series of questions. He pointed out also that it was desirable to control the plumbate to 2 grams per liter, since having too high a concentration did raise the possibility of gum trouble. Color stability of gasoline treated by the process, was fair, he said.

One of the plant operators wanted to know what would be required to convert the conventional treating plant to one similar to that described. The speaker said that the plant he has used as an example cost approximately $2000, but that it was hardly fair to take that figure since virtually all the equipment had been bought at retail as needed or made up to specifications. The porous cell jars, he said, were approximately $3 each but in larger lots he was confident this price could be more than cut in half.

Turning finally from the treating process the plant operators discussed briefly some of the questions that had been held over from their previous meeting in Shreveport. One of the questions pertained to the use of settling drums for removal of salt. The plant men generally agreed that the most effective method in connection with use of settling drums was to keep a temperature of approximately 250 degrees F., with about 200 lbs. pressure, and to wash the incoming crude with 5 to 10 per cent water, and above all to hold sufficient pressure to prevent vaporization. One operator said he had been able by this method to reduce salt content of 25 to 40 lbs. per barrel of crude to about 5 lbs. per barrel.

Tube Failures In Refinery Tube Stills

(*Continued from page* R-130)

its corrosion resistance and, therefore, accelerates the attack of the corroding agent along the grain boundary.

This brief summary of accumulated investigations over the past 20 years has been compiled for the interest of refinery engineers using still tubes. In this period, great advances have been made in the design, operation, and control of cracking still plants, even though more severe conditions were gradually being imposed upon the equipment. It is now possible to process the most corrosive crudes and to conduct polymerization and reforming operations at temperatures and pressures which were unheard of 15 years ago. With these advances in the cracking art, the general average life of still tubes has also been greatly increased. Still tubes, which previously would not have lasted more than two to 10,000 hours, are now being used in service for periods of 30,000 to 60,000 hours. This has largely come about through improvement in tubes and tube metals, but more particularly to advances in design and in operating control of cracking still furnaces. In 99 per cent of the furnace tube failures which have been investigated, there have been no examples of really defective steel or poor workmanship in tube manufacture, and this has been particularly true during the past five or ten years.

Many persons have contributed to this paper through work done during the past twenty years. The writers wish particularly to thank Dr. R. H. Aborn of the U. S. Steel Corp. Research Laboratory; Dr. R. W. Moore of the General Laboratories of Socony-Vacuum Oil Co.; and Wayne Colmery, metallographist, Ellwood Works, National Tube Co., who prepared many of the illustrations.

"Operating Kinks" Again Feature N. G. A. A. Convention

TULSA, March 21.—The Operating Kinks Session will again be one of the main features of the 17th Annual Convention of the Natural Gasoline Association of America in Tulsa May 11-13, J. W. Vaiden, chairman of the program committee announces. Because the two previous sessions on these developments have been so successful the committee is confident that this one will be well represented and will fill an important part of the meeting.

Eight prizes, totaling $125, will be awarded to the first and second place winners in four classifications, into which the Kinks contest will be divided. As in former sessions, operating men will present the morning of May 13 short papers discussing original ideas which these men have developed for solving production and operating problems. Discussions of these ideas will be informal, giving opportunity for operating men to exchange information on their own problems.

In meeting where formerly the time has been devoted to rather highly technical problems which affect the whole industry, this session gives recognition and place to a most important group in the natural gasoline industry, J. A. LaFortune, association president, believes.

F. E. Fisher, Skelly Oil Co., is chairman of the sessions and awards committee, which will award $15 and $10 respectively to the first and second place winners in each classification, and a grand prize of $25 to the best and most practical idea in all classes. To govern the contest, the program committee has announced the following rules by which all ideas and papers will be judged:

1. Any employe of a natural gasoline manufacturer may submit one or more "operating kink" ideas.
2. Permission of the employer must be secured before any idea is submitted.
3. Each idea must be submitted in writing and three copies of each must be presented in the form designated on the "operating kink" blanks which may be secured from the Natural Gasoline Association of America, 819 Wright Bldg., Tulsa, Okla.
4. One clear drawing or distinct photograph may be submitted with each kink and wherever possible the association will make slides therefrom.
5. Five minutes time will be allotted to an employe, at the round-table discussion, for the explanation of each of his kinks.
6. The originator of the kink, although urged to do so, need not be present to explain his idea. Any employe of a natural gasoline manufacturer may explain the idea of any other employe of the same concern.
7. Prize awards are to be made by a committee of gasoline plant operators and their decisions will be final.
8. All "operating kink" entries should be in the N. G. A. A. offices by May 1, 1938, in order that the judges may have ample time to study and classify the entries before the meeting date.
9. Any "operating kink" entry may be made within the following classifications:

(a) Operation or maintenance of engines, compressors, pumps, turbines, electric motors, electric generators or boilers.

(b) Metering or other volumetric measuring; temperature controlling, pressure controlling, volume controlling, liquid-level controlling, laboratory equipping or operating methods.

(c) Gasoline or oil distillation; fractionation; gasoline absorption, condensation or cooling; gasoline or gas treating.

(d) Field pipe-line and other field operation and maintenance; gasoline storing; gasoline loading; special tools, labor saving or safety devices; accounting or record keeping methods; or any other phase of natural gasoline manufacture not covered within the preceding classifications.

Turbulence of Fuel-Air Mixture Is Best Measure of Burners

MOST ESSENTIAL FACTORS in successful burning of any fuel are time, temperature, and turbulence in the proper balance, O. F. Campbell, Sinclair Refining Co., said in a discussion of combination oil-and-gas burners at a meeting of the American Society of Mechanical Engineers in Los Angeles, March 23-25*. Modern industrial furnace temperature is usually low to keep furnace maintenance down and the fuel-burning rate is high per cubic foot of furnace volume to obtain high capacity.

The best burner provides the greatest amount of turbulence, or intimate mixing of fuel and air. Combination burners should be able to burn either oil or gas equally well when burned separately or simultaneously. With existing equipment the only opportunity to lower fuel consumption is by lowering heat losses up the stack by more accurate adjustment of the air-fuel ratio. Advantageous in calculations are graphical means to eliminate, as far as possible, the tedious and laborious computations. For this purpose Mr. Campbell presented one table and six charts based upon previously published data.

Choice of burner was found to present many problems. First consideration is long operation without cleaning or repair. Design should allow for quick cleaning during operation with minimum outage. For wide-swinging firing rates, the burner must be flexible enough in capacity to meet all loads equally well. Material of construction must withstand temperatures and air and fuel velocities must produce satisfactory ignition. Thorough atomization and intimate mixture of oil and air are best obtained by preheating the fuel.

* Meeting in conjunction with the Western Metal Congress.

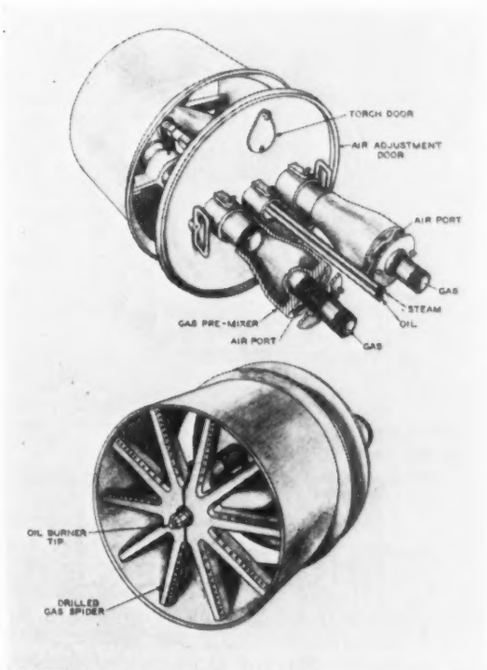


Fig. 1. Combination oil and gas burner, natural draft, cold air, two section pre-mix drilled gas spider, steam atomizing internal mix oil burner with round drilled tip. (Courtesy of John Zink Co.)

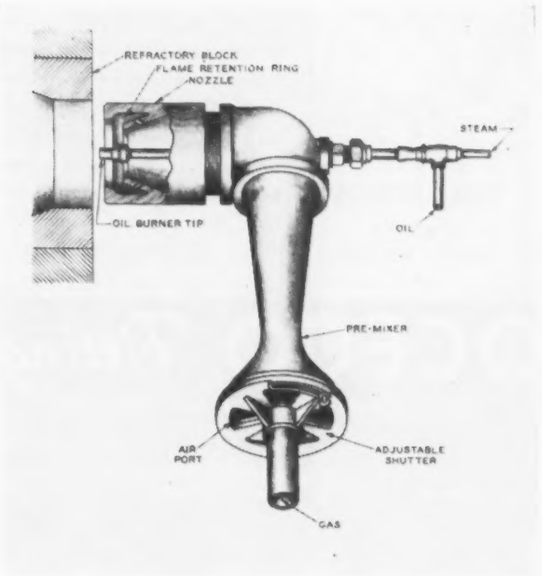


Fig. 2. Combination oil and gas burner, natural draft, cold air, open port pre-mix gas burner with adjustable air shutter, steam atomizing internal mix oil burner with round hole tip. (Courtesy of Maxon Premix Burner Co.)

Methods of atomization, in order of low total cost are (1) mechanical, (2) stream, (3) low air pressure, and (4) high air pressure. Total cost includes fixed charges and operating costs. Requirements for gas burners are similar with respect to intimate mixture, plugging up, and cleaning. One of the more important problems in burner design is whether or not the burner will stay lighted, regardless of the air velocity through the burner itself. Ignition has been found to be a function of velocities, turbulence and temperature *after* the air-fuel mixture has passed through the burner and not a function of air and gas velocities through the burner.

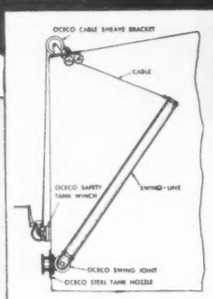
Many furnace troubles are laid to everything but the burner in spite of the fact that the burner is usually to blame, Mr. Campbell said. In many cases where fuel oil has been blamed, the trouble was corrected by changing either the burner or the furnace and continuing to use the same fuel oil. It is Mr. Campbell's experience that any grade of fuel oil that can be delivered to the burner will burn satisfactorily, provided the burner design is correct.

Several types of burners were described in an impartial way in which both favorable and unfavorable characteristics were presented. A cellular type burner was described which operates on a few ounces of gas pressure and requires low draft and low excess air on account of the large number of small air-gas ports. This makes it difficult to clean however, and it has a tendency to plug up. It has a wide application and sizes vary from 500,000 to 13,000,000 B.t.u. per hour.

The burner in Fig. 1 is used with a natural draft. The gas-burning feature is of the bimix type and each of two sections of the spider is equipped with a premixer similar

OCECO *Swing Lines*

MEET THE REQUIREMENTS OF PRACTICAL OPERATION



Specify
OCECO FITTINGS
your tanks
deserve the best

• Oceco swing line equipment consists of a steel nozzle, a heavy duty swing joint that will not twist or leak, a gas-tight stuffing box and cable sheave mounted on the tank top, and winch—all of Oceco's serviceable design and dependable manufacture. Winches are worm geared and self-locking. Oceco swing lines meet any tank requirement. Write for descriptive literature.

OCECO *Fittings*

THE JOHNSTON & JENNINGS CO.
OCECO DIVISION
885 Addison Road • Cleveland, Ohio
Engineering and Sales Services: NEW YORK • CHICAGO • PITTSBURGH
BEAUMONT, TEXAS • TULSA, OKLAHOMA • LOS ANGELES • OAKLAND, CALIF.

Lubricating Greases; Their Manufacture and Use

By E. N. KLEMGARD

AT LAST—an ultra-modern, up-to-the-minute 872-page volume on greasemaking and its use for lubrication, by a recognized authority. New developments are given in this book for the first time in permanent published form.

This new book is the only publication available today which covers the entire grease field. The newest technology of greases is presented in detail. Hundreds of types of greases are discussed.

Some of the subjects discussed are: The Theory of Lubricating Grease and Their Manufacture; Colloidal Nature of Greases; Grease-making Materials and Equipment; E. P. and Hypoid Compounds and Lubricants; Calcium, Sodium, Aluminum, Lead, and other Types of Greases; Miscellaneous Organic and Inorganic Lubricants; and Foreign Grease Specifications both Manufacturing and Application Methods—Information obtainable from no other American source.

Price $15. Order It from Book Department

NATIONAL PETROLEUM NEWS
1213 W. Third St. • Cleveland, Ohio

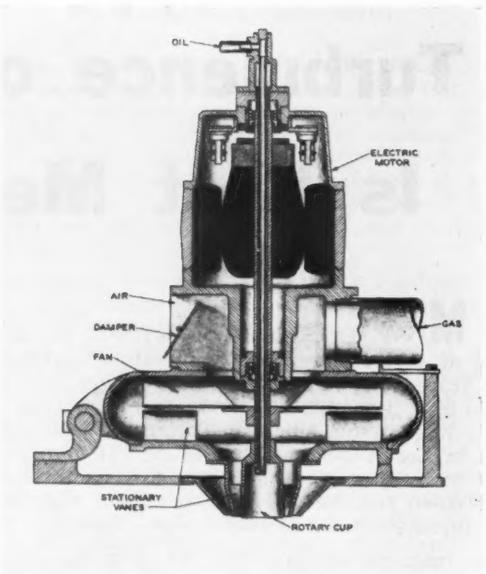


Fig. 3. Combination oil and gas burner, semi-forced draft, cold air mechanical pre-mix gas burner with adjustable air damper, rotary cup mechanical atomizing oil burner. (Courtesy of Williams Bros. & Miller)

to that on domestic stoves using high-pressure gas. The burner has the advantage of simplicity, ease of ignition, ability to handle gas of high calorific value, wide range of flexibility, does not plug up readily, and is easily cleaned. The premixer may be plugged by dust-laden air however and it may freeze up in extremely cold weather.

A venturi premix type is shown in Fig. 2 which requires 0.5 to 30 pounds per square inch gas pressure. The gas nozzle has a flame-retention ring for positive ignition without use of baffles or ignition tunnels. This burner utilizes the energy of the gas pressure to accomplish its mixture with air and no blowers or air compressors are required. It has the disadvantage of large size with respect to capacity, necessity of using high gas pressure, possibility of the aspirator plugging up with dust-laden air and freezing at extremely low temperature. Its ad-

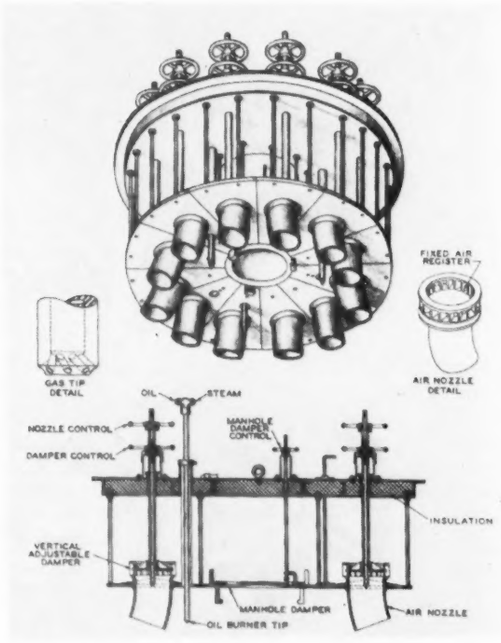


Fig. 4. Special alloy combination oil and gas burner, forced draft, hot air, 12 dampered fixed register air nozzles capable of 360° rotation, equipped with special drilled non pre-mix gas burner tips, three steam atomizing internal mix oil burners with drilled cone tips, adjustable center manhole for secondary air control. (Courtesy of Coen Co.)

vantages are flexibility, intimate mixing of air and gas over wide ranges without blowers or compressors, ability to retain ignition, handle gas of high calorific value, and produce high rates of heat release per cubic foot of furnace volume.

Oil is delivered to a rotary cup through a hollow motor shaft in the burner illustrated in Fig. 3. There it is atomized and low-pressure air is delivered around the cup by means of a fan having a speed the same as the cup. Secondary air is admitted into the furnace through a brick checker-work floor. When burning gas, the gas is admitted into the suction of the fan along with the air used for aiding in the atomization of the oil. The burner's advantages include the ability to handle any grade of fuel oil or gas of any calorific value at any pressure. Main disadvantage is difficulty of adjustment of the air-gas ratio. Best application is where on-and-off control is satisfactory.

Designed for use with 1100° F. preheated air, the combination burner in Fig. 4 has a capacity of 100,000,000 B.t.u. per hour. It fires downwardly. Each of the 12 nozzles is equipped with a fixed air register as shown by the air-nozzle detail and air supply is controlled by a circular damper inside each register which is moved up or down by control wheels. The air nozzle can be rotated through 360° by means of a nozzle-control wheel. Main advantage is heat-distribution control at high capacity. It is able to operate at low capacity with low excess air and satisfactory heat distribution, however. Main disadvantages are plugging of gas tips when using dirty gas and necessity for high wind box and gas pressures.

* * *

Loading Rate Important in Strength Tests

A temperature dividing line between two general types of stress reactions of steels was defined by R. L. Wilson in a paper on The High-Temperature Strength of Steels. He distinguished these behaviors as due to the changing strength relations of the crystalline grain components of the steel and the intergranular material. Since the intergranular material, which acts like a vitreous amorphous solid, is stronger at low temperatures and the grains are stronger at high temperatures, there must be some temperature at which these two phases have the same strength. This temperature, which was designated as the equi-cohesive temperature, is a most important temperature in considering the strength of steels, he said.

At temperatures below the lowest temperature of equi-cohesion, the rate of loading does not have much effect on the tensile properties, but at the higher temperatures the strength and ductility of steels are greatly affected by the speed of testing, Mr. Wilson said. For applications involving the use of steels at temperatures below the lowest temperature of equi-cohesion, there is no reason why reliable designs cannot be based upon the yield or ultimate strength of the materials as determined in the hot tensile test. Cases of overheating pearlitic steels in high temperature service, however, may be interpreted by the short-time properties within the approximate temperature range of 1000° to 1500°.

Above the equi-cohesive temperature the effect of time first becomes a significant factor in the behavior of metals under stress. At these higher temperatures deformation does not remain constant but increases continuously with time, so that steels flow or creep even under the smallest loads. Strength must, therefore, be expressed in terms of temperature, stress, deformation, and time. Reasonable creep can be tolerated in certain instances such as tubing used in the oil industry, but the steel must be capable of sustaining definite stresses safely for a predetermined time. In estimating the high temperature strength of steels for design purposes, the problem becomes a matter of knowing what limitations on either deformation or stress are permissible.

Tensile strength of steels as determined at temperatures above the equi-cohesive temperature depends upon the rate of loading employed in breaking the specimens. When the rate of loading is so slow that fracture only takes place after a great interval of time the ultimate strength will be at about its minimum value, which can be called the long-time tensile rupture strength of the steel.

* * *

Recommends Stress-Rupture Test

The stress-rupture test for determining high temperature characteristics of steels was recommended by A. E. White[1], C. L. Clark[1], and W. G. Hildorf[2] in the paper presented at the Western Metal Congress of the American Society for Metals, for applications in which the permissible deformation is not limited to relatively small amounts, as for example, 1% in 10 years. Creep characteristics, it was indicated, are an ideal basis of design for those applications where the total amount of deformation is limited to very small amounts but they do not necessarily define the complete high temperature behavior of a given steel where deformation is not so limited. It is for such cases that the stress-rupture test is suggested, either by itself or in conjunction with the creep characteristics.

Among the characteristics revealed by this test are the load-carrying ability and the influence of time, temperature, stress and atmosphere on the structural and surface stability. It was said to be of special value in this connection because various controlled atmospheres can be readily maintained during the test. Furthermore, extrapolation to longer time periods are more justified than in most other types of test because the values upon which the extrapolation is based are themselves fixed, not dependent on testing conditions, and a more definite relationship exists between the two variables, stress and fracture time.

The test indicates the degree to which a steel can be overheated during service and the length of time this overheated condition can be maintained. It is believed to be the best means available for indicating the combined influence of time, temperature, stress and atmosphere on the resulting overall ductility and the surface and structural stability.

Procedure of the test is similar to the creep test in

[1] University of Michigan. [2] Timken Roller Bearing Co.

INDEX TO ADVERTISERS

Refining Technology Section

This index is published as a convenience to the reader. Every care is taken to make it accurate, but National Petroleum News assumes no responsibility for errors or omissions

Alco Products Div. of American Locomotive Co...
Badger & Sons Co., E. B. .....
Chicago Bridge & Iron Co. R-119
Crane Co. .....
Clark Bros. Co. R-117
Dresser Engineering Co. .....
duPont de Nemours & Co., E. I. .....
Edeleanu Co., Ltd. .....
Gasoline Products Co. R-133
Gray Processes Corp. .....
Hanlon-Buchanan, Inc. .....
Johnston & Jennings Co. R-142
Kellogg Co., M. W. .....Insert
Koppers Co. .....
Lummus Co. R-131
Monsanto Chemical Co. .....
Nichols Copper Co. R-137
Petroleum Rectifying Co. of Calif. R-122
Polymerization Process Corp. R-114
Shand & Jurs Co. .....
Sharples Specialty Co. .....
Sun Shipbuilding & Dry Dock Co. .....
Texaco Development Corp. .....
Universal Oil Products Co. 27

(See also page 64)

that the same type specimen is used and, if desired, the same equipment may be employed. It differs from the creep test, however, in that the specimens are carried to actual fracture and the rate of deformation during the test is not necessarily determined. It is believed that stress accelerates certain of the structural and surface changes which may occur under the influence of time and temperature and shorter time tests of this type may, therefore, indicate the changes to be expected under more prolonged tests with lower stresses.

* * *

Want Better Welds for Pipelines

Development of welding practice is of particular interest to pipeline engineers, L. F. Scherer, The Texas Pipe Line Co., said in summing a discussion of metals for pipelines and pipe manufacturer. Means of assuring uniformity perfect welds, not only in the pipe now used (carbon content of 0.30% or less) but in pipe of a higher carbon content, would be welcomed, he said.

Use of the lower carbon content is due to a large extent to the thermal effects of the weld which would tend to nullify the admitted advantages of pipe with higher carbon content. A means of readily determining a poor weld by some simple and economical device or test would also find ready acclaim.

Choice of the type of pipe to be used in a pipeline, when everything is considered, becomes largely one of engineering economics based on service life required, class of service, availability, freight, and handling costs, Mr. Scherer declared. While there is some variation in price of pipe, the cost per mile has been found to vary but little. Lap welded pipe, for example, may be less expensive but must be heavier. This means higher freight and handling costs which rapidly offset the slight price advantage.

Four classes of pipe are employed: butt weld, lap weld, electric weld and seamless. Generally speaking, the butt welded pipe is no longer used for high pressure lines due to the difficulty in obtaining perfect joints. Some of these difficulties are also inherent in lap weld pipe but uniformity of welds is better. Electric weld pipe, due to the cold working process in forming, has a higher ultimate strength and consequently higher working pressures can be carried with a given wall thickness. But here again is a possibility of leaks due to rough handling in transit.

Seamless pipe is made by two basic processes: the "Piercing process" and the "cupping process." The former is more common for pipe sizes used in pipelines. Pipe made by this process has none of the brittleness incident to cold working, Mr. Scherer said. It has a fine and uniform grain structure and is slightly stronger than a full annealed tube made of the same steel.

Problems induced through handling corrosive crudes probably can all be solved by proper applications of special metals and alloys. At present, use is made of cast iron, wrought iron, or copper bearing steel pipe but improvement is desirable both in quality and cost.

Michigan Refiners' Assn. States Objectives

ALMA, Mich., March 19.—Purpose of the newly formed Michigan Oil Refiners' Assn. has just been announced by Secretary Herman Berg. First is to work for revision of transportation rates which will permit expansion of the trade and sales territory of members and to assist members in traffic problems. Other objectives are to inform legislative bodies of the facts concerning oil refining as a business and to promote any reforms in the industry that are favorable to refining.

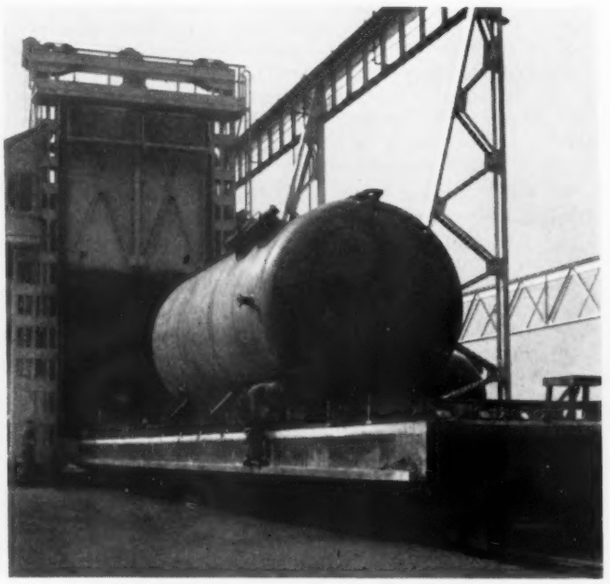
B. J. Skinner, president of Mid-West Refineries, is president and general manager of the new association and D. E. Foster, vice president and general manager of McClanahan Refineries, is vice president. Treasurer is Reid Brazell, vice president and general manager of Leonard Refineries. Membership now includes ten Michigan refiners.

Welding Survey Shows Petroleum Industry Leads in Adoption

The lead in the adoption of arc welded construction appears to have been taken by the petroleum industry, it has been found in a survey conducted by the electric welding section of the National Electrical Manufacturers' Assn. In operating conditions which call for the extremes in safe construction, it is said to be significant that practically all new construction in oil refining is welded. This welded equipment must stand up under pressures up to 1500 pounds per square inch and temperatures ranging from —150 to 1100° F. In transportation the use of welding in the thousands of miles of pipelines is common knowledge and now the largest ocean going tankships are being constructed without the riveting hammer.

More important in refining is the fact that the process has not been adopted so much for its low cost as for improvement in production capacity, it is stated. Welded cracking stills were first used in 1925 and within five or six years an estimated 1500 welded pressure vessels were installed in refineries. In the next five years there were about 7000 more.

Credit for a sound basis in design trends with arc welding is attributed largely to the development of means for preventing atmospheric contact with the weld during its formation. Chief obstacle during the forty years of study given to making welding suitable for assembling structures in which safety and dependability is of vital importance, was the picking up of harmful elements from the atmosphere by the molten metal produced at the weld. When this was overcome by surrounding the weld with gases which excluded air during the welding process, weld metal resulted which was at least 100% as strong and sound as the material which it joined, according to the association's statement. These gases are formed by the melting of a coating on the welding wire.



This all-welded pressure vessel has been stress-relieved at the Birmingham plant of Chicago Bridge & Iron Co. It will be set up for the Phillips Petroleum Co. at Kansas City

New Chicago branch headquarters of Crosby Steam Gage & Valve Co. after April 1 will be in the Marquette building.

The newest station in Cleveland of the so-called hybrid type, featuring the gasoline and lubrication business as well as the car sales room. The sales and service plant, of the Guthery-Schreiber Chevrolet, Inc., in Cleveland, covers a lot 125 by 200 feet. Cleveland now has three stations of this same type

SALESMANSHIP

Key Factor In Car Lubrication

AUTOMOBILE DEALERS, in Cleveland at least, are in the same category as gasoline service stations when it comes to the car lubrication business. Some are succeeding at it and some fail to hold the business they once had. By and large, the success of the car dealer in this phase of servicing seems to depend to the same degree on salesmanship and initiative in individual cases as with the service station operators, in spite of the aid which is being given by the automobile manufacturers in many cases.

The car dealer's importance in automotive lubrication sales has been emphasized greatly the past year or so, since car manufacturers have been urging their dealers to get into this class of work, have developed lubrication merchandising programs for them and so on. A few of the larger oil companies have made special efforts to sell oil and grease to car dealers.

However, it seems likely that the car dealer's relative importance in this field is overemphasized in some quarters, if their experience in Cleveland is taken as a criterion. A NATIONAL PETROLEUM NEWS staff writer studied car dealers' operations in lubrication servicing and their sales of gasoline, oil and grease and the accompanying article is based on his observations.

In 1937 seven large car dealers in Cleveland, showed an average of $14,400 in gross sales of gasoline, oil and grease. In 1936 their sales averaged $13,740. This was a gain of about five per cent and is moderate in view of the increase in sales of some oil companies. An accompanying table gives the figures for the two years for the seven dealers individually.

These figures do not include at all sales by car dealers of cars, or automotive servicing, by far the most important phases of their business. The figures may be said to represent an index of that portion of their business which is competitive with the gasoline stations. Figures are not available to compare this portion of their business with the average sales of gasoline stations in Cleveland. The census by the U. S. government of retail distribution in 1935 shows an average sales for the close to 200,000 filling stations it reported on over the country of about $9500 in that year. This includes the sales of stations of all types, in cities, small towns and in the country, and the average for Cleveland is considerably above this figure.

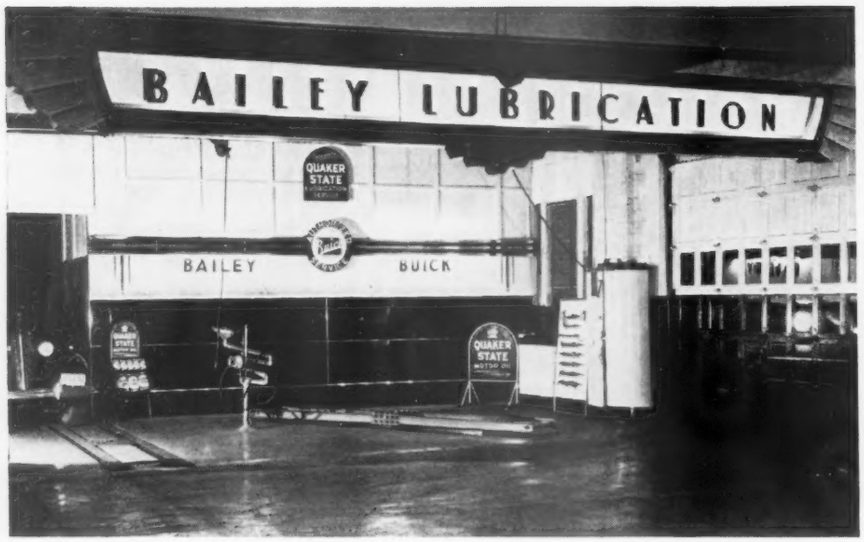
In greater Cleveland, a city of one million, there are 184 automobile agencies, according to the best available count verified by the classified section of the Cleveland telephone directory. Of the 184, approximately 34 were described by oil company salesmen calling on motor row as bad credit risks, hole-in-the-wall dealers with negligible volume, or without lubrication facilities entirely.

CONCERNING the advantages and disadvantages of car lubrication service and oil and grease and gasoline sales by the remaining 150 dealers, wide disagreement was expressed by oil company sales managers here. In brief, however, the following criticism was leveled at the auto dealer as a petroleum marketer:

Automobile dealers are interested in the $150 gross profit on new car sales and not on a 17-cent profit in five gallons of gasoline.

The automobile dealer is out of touch with petroleum marketing and has neither the interest nor technical knowledge necessary for successful selling of gasoline and oils.

Automobile dealers many times are split accounts and will not push any



This well appointed lubritorium is located in the basement garage, reached via ramp, of the Bailey Buick Co., Cleveland car dealer. The background is washable and was installed to give tone to the department

particular brand of motor oil or greases.

Automobile dealers cannot get their customers back into their places of business after the warranty period on the new car is up. The corner filling station is far more convenient for the motorist and he will not drive into a garage for a grease job and an oil change. These garages are not only inaccessible, but cold (in winter), noisy, crowded and dirty.

AUTOMOBILE dealers cannot draw lubrication business because they push repair work so hard that motorists shy away from the garage—particularly if they are in a hurry or short of change.

Automobile dealers are particularly subject to reciprocity. Everytime some oil man buys a car, his brand goes on the dealer's shelf.

An automotive dealer's trade is limited, by public habit, to the make of car he sells.

The automobile dealer is under the dominance of his manufacturer and therefore primarily pushes batteries, tires and accessories with which the car manufacturer has a tie-up, rather than the batteries, tires and accessory products of manufacturers with which the oil company has a tie-up.

The automobile dealer is apt to look upon the oil company as a sugar daddy and to call upon it with plans and specifications for an auto-lubrication setup —to be financed by the oil company.

This last criticism particularly applies to the so-called hybrid operation: an automobile sales room and service garage with a modern lubritorium or gasoline station built-in on the corner. These hybrid stations present problems and advantages to the oil company entirely of their own, and are considered by Cleveland companies in a separate category from lubrication departments in automotive dealer service garages. There are only three such hybrid stations in Cleveland, two built within the last ten months.

On the other hand, a canvass of oil sales managers here elicited the following opinions of advantages enjoyed by the auto agency as a marketer of petroleum products.

The automobile dealer has the first crack at the motorist. Under warranties included with every new car, the buyer receives free check-up and lubrication service for 90 days or 1500 miles and may get into the habit of coming to his automotive dealer for this service.

In addition to the warranty period, automobile dealers sell their customers lubrication contracts—sometimes included in the financing charges—so that the motorist can drift to the service station only at additional expense to himself, for a considerable period after he has bought a car.

Automobile dealers are pushing follow-up systems just as service stations do.

Motorists have greater faith in the mechanical ability—the ability to recognize all grease fittings—of the agency mechanic than in the filling station attendant who services all makes of cars.

Automobile dealers have installed motorcycle service and courtesy cars to facilitate patronage by business men and by women.

By virtue of the growing infrequency of the oil change period, the motorist is apt to need service check-up as well as lubrication and have both accomplished at once.

Automobile agencies receive service bulletins from their manufacturers every month pointing out defects that have been found to occur in a number of cars and asking the dealer to make necessary repairs or adjustments, when the car is in for any type of servicing. Standard Oil Co. of Ohio products are marketed by nearly one-third of the 150 responsible car dealers in Cleveland a survey by NATIONAL PETROLEUM NEWS showed, and 90 per cent of these are 100 per cent Sohio accounts as far as motor oil display is concerned.

Great variance in gross gasoline, oil and grease sales was found among Cleveland car dealers. Socony-Vacuum Oil Co., Inc., officials said that a survey by their company revealed that 85 per cent of the business was done by 47 per cent of the automobile dealers.

What then are the merchandising methods of the top 47 per cent in Cleveland—dealers who sell $12,000 or more of gasoline, oil and grease per year? In physical volume $13,200 in gasoline, oil and grease sales in 1937, for example, amounted to the following approximate amounts:

Motor oil	5,420 gallons
Chassis lubricant	2,900 pounds
Transmission, rear axle lube	11,790 pounds
Wheel grease	425 pounds
Spring spray	150 gallons
Water pump grease	20 pounds
Knee action oil	150 gallons
Graphite spring pack	150 pounds
Flusing oil	350 gallons
Universal joint grease	150 pounds
Gasoline	22,700 gallons

The head of one Ford agency, which has been in business over a period of more than 20 years, said that there was no net profit in new and used car sales, nor much profit in lubrication work, for that matter, but that the lubritorium was the come-on for customer repair work, which returned substantial earnings for the company.

IN substantiation of his point, this executive said that in 1937 he sold approximately 700 new Fords at a profit of $30,000. However, in order to do this he had to take in and resell $180,000 worth of used cars at a loss of $36,000, or a $6000 loss for the "front end" as a whole, he stated.

To reach this car dealer's lubritorium, customers must drive down a side alley and honk at an overhead door, as is common with most auto dealers' facilities here. Not so common, however, is the inside of the service garage. Some 260 cars are arranged in four long, neat rows, so that garage attendants don't have to solve a switching puzzle every time a customer drives in. The lubritorium, set off by an illuminated background, is accessible to the doors and an attendant will quickly drive the customer's car onto one of the two racks. For the convenience of patrons, the company maintains a motorcycle pick-up and delivery service.

This Ford dealer sells 10 "lube" jobs for $5. One dollar goes to the salesman, $3.50 to the man doing the work, leaving 50 cents for the dealer to pay for the equipment, overhead and everything else. However, the lubrication work provides an opportunity to check the motorist's car and point out to him any needed repairs.

In addition to the lubrication contract, this Ford dealer gives a 30,000-mile motor guarantee to the new car buyer, providing he will come into the

Direction, protection

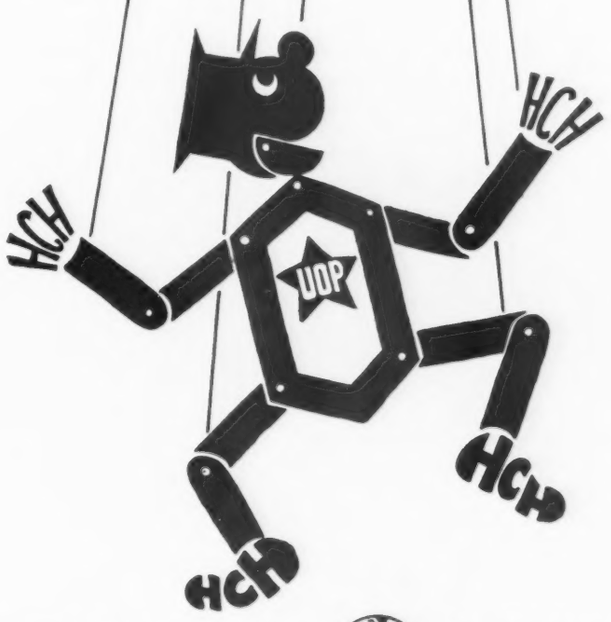
The Chemical Cop is no puppet—neither is the Chemical Sergeant—but they need direction and control and protection They get it from the organization behind them—Universal

Before the chemical police start on their anti-gumbug campaign in your gasoline, Universal specialists are on the job

They study the treating and sweetening systems They correct them when necessary to knock out chemical enemies before they knock out the cops

The U.O.P. chemical police will keep the gum all out of your gasoline

—and at trifling cost



Universal Oil Products Co
Chicago, Illinois

Dubbs Cracking Process
Owner and Licensor

THIS NEW TIRE WILL S
QUICKER, SAFER ON WET R

No Premium Price

● It's here! The non-skid tire sensation of 1938. The new Goodrich Safety Silvertown with the Life-Saver Tread. A tire that is so *far* ahead of competition, so revolutionary in performance that anyone can instantly *see* and *feel* the greater safety it gives. A tire that has started a new era of progress and profit for Goodrich dealers everywhere.

Only the Goodrich Tire Dealer can offer skid protection like this. Just one ride on a wet day will convince any tire prospect that this new Goodrich Silvertown is the safest thing on wheels. After that thrilling demonstration they'll never want to buy or ride on *any other tire!*

We've a lot more to tell you about this new Goodrich Safety Silvertown that is being offered at regular first line prices—gives you first line profits. Put yourself in the driver's seat for better sales and bigger profits in 1938. Act now. Get in touch by mail, wire, or telephone with The B. F. Goodrich Co., Dept. 500, Akron, Ohio, Los Angeles, Cal., or Kitchener, Ont., Canada.

Three years ago Goodrich started from scratch. Enlisted the creative ability of their engineering staff to give motorists a *safer* tire on wet, slippery roads—to give Goodrich Dealers extra sales and extra profits.

Tread designs by the hundred were tested, compared, to develop the New Goodrich Safety Silvertown Tire with the Life-Saver Tread that stops motorists *quicker, safer* than they've ever stopped before.

This new Goodrich Silvertown Tire was mounted on the Goodrich Silver Fleet—tested and checked "in action"—on dry roads and wet . . . at high speeds on straightaways and around treacherous hairpin curves.

The new Goodrich SAFETY S

STOP YOUR CUSTOMERS ROADS *Than They've Ever Stopped Before!*

DON'T TAKE OUR WORD FOR IT! HERE'S PROOF FROM AMERICA'S LARGEST INDEPENDENT TESTING LABORATORY

Goodrich went a step further. They turned their new Silvertown with the Life-Saver Tread over to the impartial Pittsburgh Testing Laboratory for a three-month series of exhaustive road tests against the best competition had to offer. Goodrich wanted *facts!*

Summary of Report

"BOTH *regular,* and also the *premium-priced* tires of America's six largest tire manufacturers were submitted to a series of exhaustive road tests made over a three months' period by us, to determine their resistance to skidding and wear, with the following results:

NON-SKID. The new Goodrich Silvertown with the Life-Saver Tread gave greater skid resistance than any other tire tested, including those tires listed at from 40% to 70% higher in price.

MILEAGE. The Goodrich Silvertown gave more non-skid mileage than any of the other tires tested in its own price range—averaged 19.1% more miles before the tires wore smooth.

BLOW-OUT PROTECTION. Despite the severe nature of these tests, no Silvertown Tire blew out or failed from any cause, while two tires of other makes failed."

A. R. Ellis. *President*

PITTSBURGH TESTING LABORATORY

PITTSBURGH TESTING LABORATORY · ANALYSIS · INSPECTION · TESTING · RESEARCH · ENGINEERS AND CHEMISTS

Silvertown

LIFE SAVER TREAD SKID PROTECTION · GOLDEN PLY BLOW-OUT PROTECTION

33 Automotive Services Listed on Master Card Used By Buick Dealers to Check Work on Customers' Cars

LUBRICATION
chassis lubrication
oil motor — change
crank case — flush
shock absorbers
bearings, front wheel
oil, trans. and diff.
filter, oil — new

ENGINE
motor tune
valves — grind
spark plugs — new — clean
wire, spark plug — new
carburetor — clean — overhaul
pump, fuel
choke, automatic — overhaul
valves — adjust
air cleaner — clean

ELECTRIC
battery terminals — clean
generator — overhaul
starter — overhaul

COOLING
radiator — flush — boil out
water pump — overhaul — repack
hose — re-new
fan — overhaul

BRAKES
brakes — reline
brakes — adjust
drums, brake — true up — re-new

STEERING
front end — service
steering gear — adjust — overhaul

CHASSIS
clutch — adjust — overhaul
rear axle — overhaul
transmission — overhaul
chassis — tighten
springs — re-pack — re-new

agency every 2000 miles for an oil change. Should the customer travel outside the city, a receipt for lubrication work from any Ford dealer will keep the guarantee in effect.

The lubrication men in this shop are graduates of a two-weeks course at the Cleveland factory branch of the Ford Motor Co. and have passed an examination before this car dealer will hire them.

Further, about one week after a customer has had a repair job there, he is called on the telephone and asked if the work was satisfactory. Thus the company is sure that the customer isn't angry because the brakes still squeak after all—or whatever the trouble may have been. No effort is made during this telephone call to solicit further business. The call simply verifies that the customer is satisfied. Lubrication sales at this car agency were up 15 per cent in January, 1938, over the corresponding 1937 month, while new car sales were off 30 per cent.

HOWEVER, oil and grease sales bear a direct relationship to new car sales, since an increasingly smaller percentage of new car buyers return to the car dealer for lubrication service as their automobiles become older. The head of this same Ford agency said 75 per cent of his new car customers were coming back regularly six months after purchase, and about 65 per cent at one year. These percentages were found to be representative of nearly all dealers interviewed who stress lubrication sales.

An actual check of figures given by another car dealer revealed 70 per cent of the customers coming back at the end of the first year, and about 60 per cent of the new car buyers at the end of the second year. After that, the percentage drops sharply, to 10 or 12 per cent.

Other car dealers who experienced a similar drop attributed this to the fact that automobile owners are not so careful in seeing that their old cars are serviced. Furthermore, an owner who has had his car two years is a likely prospect for a new car and, knowing this, if financially short, hesitates to drive into an auto agency for service, it is said.

Auto dealers, in computing these percentages, look upon a customer returning every 60 or even every 90 days as "regular." Obviously they have no way of knowing how many customers patronize service stations for grease jobs or oil changes in between times.

One of the principal Buick agencies in Cleveland reported its gasoline, oil and grease sales totaled $24,390 in 1935, $33,923 in 1936 and $35,144 in 1937. These figures include a larger percentage of gasoline sales than customary with automobile dealers, but the agency head was unable to say exactly how much. They do not include labor charges nor used car rehabilitation "sales." The average customer-labor sale in 1937 amounted to $4.96, so it is obvious that this agency seldom did only a grease job or an oil change. However, they did 10,927 grease jobs and 6747 oil changes in 1937 with three men working on two lifts.

The secret of these high sales was said to be the so-called master cards, which are in fairly common use by automobile dealers. At this agency one girl works four and one-half hours a day on these cards, so that the records are always up-to-date and the follow-up is systematic.

Gross Gasoline, Oil and Grease Sales for Seven Large Cleveland Car Dealers

(Selected on the basis of investment and total business)

Dealer	1937	1936
A	$16,800	$13,440
B	6,800	6,451
C	12,000	10,400
D	35,144*	33,923*
E	13,202*	15,918*
F	3,910*	4,063*
G	14,000	12,000

*Includes indeterminable, but relatively small amount of gasoline sales.

A MASTER card is filed for each customer. It contains the customer's name, address, business and residence telephone numbers, delivery date of the car and all the various body and serial numbers that are stamped on an automobile. Across the top of the card are vertical columns for all 33 services to be performed on an automobile, as shown in an accompanying tabulation.

In horizontal columns down the left side of the master card, which is 9 x 12 inches, are columns for the date, operator's number, mileage, amount paid and amount not collected.

Across the card are also the months of the year. A red tab is placed opposite the date the customer was last in the shop. Thus if a customer hasn't been in for some time, his red tab is behind in the race across the top of the card and the delinquency automatically is flagged.

These cards are filed under two classifications—active and inactive. The agency head said that, out of 3000 active car owners, 34 per cent come in every month. It is said General Motors reported 12 per cent as a high average. There are 1500 owners in the agency's inactive file. Naturally customers have a tendency to drop down into the inactive file, but continuously this agency is checking up to bring these delinquent customers back into the active file again. Here's a sample record on this score, showing the number of customers transferred from the inactive to active files as of 1938 dates:

Date	Number
Jan. 24-29	68
Jan. 31-Feb. 5	23
Feb. 7-12	37
Feb. 14-19	30
Feb. 21-26	31

This repeat business is secured through a regular mailing of one or another of 33 one-cent post cards. These cards match the 33 services listed on the master card. Perhaps a customer has failed to respond to lubrication reminders, but the master card reveals he hasn't had a motor tune up in weeks and weeks. Out goes a motor tune-up reminder and perhaps in comes Mr. Customer. Or if he doesn't, he receives a telephone call from the very-much worried dealer wondering if everything hasn't been satisfactory.

If the customer is still truant, an executive for the agency makes a personal visit. He minimizes the telephone calls—found that people were frequently called at inconvenient times.

In addition to the master cards is an elaborate system of sales quotas for the various services, including a quota for gasoline, oil and grease sales. The quotas are not idealistic goals to shoot at, but are set after a careful checkup of the past and forecast of future conditions. The quotas are set in terms of total dollar volume, rather than percentage, he said, so that the floormen will not overlook small sales. Otherwise, there would be a tendency to neglect the new car for the old "jallopy" that needed a lot of repair work.

While the Hickok Oil Corp. has built a number of auto agency-service stations in parts of Michigan, and this type of outlet has been inaugurated recently in several other parts of the country, the hybrid station is a new trend in Cleveland. Only three such stations have been built here, one by the Pocahontas Oil Corp., a Hickok affiliate. This is known as Grismer-Perkins, Inc., 9501 Carnegie Avenue, a Ford-Lincoln Zephyr dealer. The station differs from the other two in that it was financed by the oil company, built on the oil company's property and leased to the auto dealer.

POCAHONTAS formerly had a small station on the same property, which carries a high tax rate. William Minshall, Jr., manager of Pocahontas, said the advantage to his company of the hybrid station was an enhanced utilization of the property, greater than could be returned by a gasoline station alone. Further, the prestige of the dealer is added to the sale of petroleum products and the station enjoys such gallonage as is naturally controlled by the automotive dealer.

Neither the Gulf Refining Co. nor Standard Oil Co. (Ohio), which supply the products for the other two hybrid stations in the city, have an investment in the stations, other than any customary investment of an oil company in an independent dealer's plant. E. H. Painter, Inc., a Ford dealer, operates a service station handling Gulf products at 13805 Euclid Avenue. The service station, which is readily accessible with wide driveways on a flat iron corner, is part of the same building as the new car salesrooms.

Guthery-Schreiber Chevrolet, Inc., 16303 Detroit Avenue, is the newer of the two, having opened in May, 1937. Guthery-Schrieber's building covers a corner lot 125 x 200 feet, with the pump island and built-in lubritorium in the corner position.

The total plant of sales rooms, service garage, storage garage for used cars and taxis and lubritorium occupies 25,000 square feet, including the service station driveway. The lubritorium itself covers 1065 square feet. Two rear doors enable cars which have been repaired to travel from garage to lubritorium on an "assembly-line" principle. Two of the three lifts in the lubritorium are customarily used for drive-in customers automobiles, the third is usually occupied with a car from the service garage. The latest, streamlined equipment is used throughout, neatly arranged and continually cleaned to give a new, bright appearance.

The equipment in the lubritorium of this station includes an overhead pressure system, with two lines for gear oil, two lines for hypoid lubricant, and three lines for chassis lubricant; three hydraulic lifts; one battery rack; one overhead tire rack; two overhead air reels; two battery chargers; one gun board; seven oil drums and pumps; one fan belt rack; one spark plug tester; two drain cabinets; one tool bench; three accessory display racks.

The chief advantages of the hybrid station to the automobile dealer are similar to the advantages of the service garage lubritorium common to most auto agencies. They provide a means of customer contact for new car sales and a source of repair work. Likewise the advantages to the oil company are similar to the advantages of any automotive account.

However, there was much sharper disagreement among oil company men interviewed on the merits of hybrid operation—as is natural in a new development—than on the merits of soliciting wide-awake auto dealer accounts. They said it was not necessarily true, for example, that a hybrid station would sell more gasoline and oil than a service station alone, if it were located on the same corner. While some Cleveland companies favored investment in dual stations, others said that hybrid stations were fine as independent dealer accounts, but they would put no money "into someone else's business."

Cleveland's hybrid stations are too new and few to facilitate a determination of what can be expected of them in volume of gasoline and oil sales, but on one point all oil companies were in agreement: much depends on the familiarity of the individual auto dealer management with the specialized problems of petroleum marketing.

Oklahoma Wage Law Effective May 1

TULSA, March 21. — The obligatory order and regulations pertaining to service station employes, issued under Oklahoma's new minimum wage law, have been mailed to employers by the Industrial Welfare Commission. The order will become effective May 1.

The service stations are grouped with motor vehicle retailing, garage, storage and parking industries under the heading "Automotive Industry."

Wages and hours are designated under three classifications. Male employes in cities of 40,000 population or "Class A" or over have a minimum of $18 a week and a 54-hour week; those in towns of 10,000 to 40,000 population or Class B have a minimum wage of $16 for a 57-hour week, while those in towns of less than 10,000 population or Class C have a minimum wage of $14 for a 59-hour week.

Female employes under the first or "Class A" classification have a minimum of $18 for a 48-hour week; those under Class B, $16 for a 48-hour week, and those under Class C $14 for the 48-hour week.

Male and female employes are not permitted, under the administrative regulations as issued, to work more than six days in any seven-day period.

Employes coming under Class A cannot work more than nine hours within any 24-hour period; those in Class B more than 10 hours, and those in Class C more than 10 hours. Females are not permitted to work more than nine hours within any 24-hour period.

The regulations also specify that minors, those learning, aged, infirm and physically handicapped also are to receive the same minimum wage standards which apply to persons over 18, except those who are licensed by the commission.

Each employer is required to keep a complete record for each employe and to submit that record, on demand, to the commission.

A check among service station operators indicated that employes will be little affected by the wage provisions, since the present scale in Oklahoma cities now ranges from $20 up. It has been pointed out, however, that the hours provision may cut some station employes' wages down close to the minimum due to the loss, in some instances, of the seventh day's wages.

There has been some question in the minds of employers as to the status of negro porters. Under the "definnitions" listed in the obligatory order, the following phrase appears, ". . . . provided, however, that porters may be classified under Sections 13 and 14, Chapter 52, Article 1 of the Session Laws, 1937."

Section 13 is the one providing for licensing by the commission of special employes by the commission, while Section 14 pertains to employment of minors.

The present wage scale for porters, it was reported in some quarters, ranges from $10 to $14 a week. Several station operators have indicated that, if they are forced to pay porters

the minimum wage applicable to other employes, the negro porters would be replaced with white employes who could be both porter and assistant attendant.

The minimum wage law, Senate Bill No. 399, was enacted by the 1937 Legislature. The Industrial Welfare Commission is a body which administers the law and is composed of Gov. E. W. Marland, Labor Commissioner W. A. Pat Murphy and State Industrial Commission Chairman Andrew Fraley. The commission is authorized to hold hearings with employers in the various industries and to issue the wages and hours regulations on the basis of facts developed at those hearings.

CHICAGO—A plea to aid in lowering the 1938 traffic accident toll was sent today to all Standard Oil Co. of Indiana stockholders by Edward G. Seubert, president.

Stockholders were urged "to work actively as individuals" to reduce accidents. A suggestion was "anyone attending a meeting can ask the chairman to suggest that all present give thought to safe driving as they go away. Other ways of helping will suggest themselves."

The letter noted the "response was gratifying" to Seubert's suggestion last fall that college and high school authorities urge safe driving from football games.

Oil and Gas Map of Illinois

By Alfred H. Bell and George V. Cohee, Illinois State Geological Survey, Urbana, Ill. Price 35 cents.

Several years had passed since publication by the state of a comprehensive oil and gas map. This brings down to a recent date the development pattern, including the new fields of the central Illinois basin. Pipelines, pump stations and refineries in the state are also shown, with tables giving their location.

Novel System Cuts Rubbish Collection Cost 72 Per Cent

ALTHOUGH the refinery at PHILADELPHIA and large oil storage plants have been subjected to many operating economies which aid in achieving the ultimate and elusive goal of a better product at constantly lower cost, that unsung item of rubbish and refuse disposal has been glorified all too little.

At most refineries, the collection of debris is usually alloted to one or a fleet of small dump trucks. That was exactly how The Atlantic Refining Co. collected it at its Point Breeze plant at Philadelphia.

Prior to last fall, this plant employed 17 1½ ton dump trucks throughout its 600 acre property to collect rubbish and do hauling jobs in connection with maintenance work.

Then in September of last year a new kind of truck, engineered and built by a private equipment concern, rolled into the plant and brought in its wake a new meaning to the phrase "rubbish collection."

Now three of these trucks are operating through the plant on a unique system that already has eliminated the need for 12 of the dump trucks originally used for the system.

Throughout the entire plant there are 80 permanent sanitary locations spotted by small white signs, with each location given a number. At each of these points is located a two cubic yard metal container for rubbish, mounted on four legs about four feet high.

In each of the 80 sections of the plant, one person is charged with the responsibility of keeping that section clean and seeing that all rubbish is placed in the container body. When the body is full, the person in charge calls the dispatcher's office in the plant and one of the three small trucks is sent to that point to pick up the load.

The truck, entirely custom built except for a standard 1½-ton truck engine of a standard make, is close coupled and resembles a truck chassis without a body. Skids are mounted on top of the frame which may be raised approximately 10 inches and then tipped backward at an angle of about 60 degrees, pivoting at the rear of the truck frame.

With this truck, the operator is enabled to back the truck under the container body and between the body legs. The skids on the truck are then raised, lifting the container body off

They Handle Expo's Transportation Problems

TULSA—Handling the arrangements to transport an estimated 34,000 out-of-town visitors to Tulsa for the International Petroleum Exposition May 14 to 21 and the 10,000 pieces of equipment to be on display there is the task of the Expo's Transportation Committee. Over 26 transportation units were represented when the committee and the Tulsa Traffic Club met recently in Tulsa. Representatives attending shown in the picture are, left to right: W. N. Reimers, S. D. & M. railroad; W. L. Meyers, Katy railroad; J. E. Payne, Frisco railroad; W. G. Skelly, Skelly Oil Co., president of the Expo; A. F. Winn, head of the traffic department, Skelly Oil Co., chairman of the Expo Transportation Committee; J. S. Rollman, Santa Fe railroad.

the ground and permitting it to be hauled to the dumping ground. Once at the point of dumping, the skids are tipped and the body, held in position by notched bars, unloads its contents much the same as a conventional dump truck body.

The trucks remove the container bodies only upon assignment from the dispatcher's office, and on every trip to a point where a load is to be picked up, the truck takes along an empty container to leave in its place.

In addition to the 80 bodies used at permanent locations for rubbish, there are 60 other bodies, known as maintenance bodies, which are used for material other than refuse but are hauled around the plant by the same method.

Two oil-operated, hydraulic cylinders on the truck control the movement of the skids. One cylinder controls the lifting mechanism and the other actuates the tipping operation.

One of the primary reasons for the ability of this collection system to eliminate the work of 12 dump trucks is the fact that the truck is not required to wait for the body to be loaded. This factor alone, plus the overall flexibility of the system, is making it possible for one of the new trucks to haul 40 loads in a seven-hour day, as compared to 8 loads during a similar period with the old type equipment. This comparison is on a basis of equal loads per unit with both old and new equipment.

With the new truck equipment, the average distance covered per trip is eight-tenths of a mile, while the average complete trip cycle is about 15 minutes per unit. According to plant officials, each truck covers about 33 miles per day. While the operating costs of the new style trucks are slightly more per hour per truck than the trucks that they replace, the total savings amount to about 72 per cent. The drivers work on a wage incentive plan as a means of keeping the truck unit operating to its maximum capacity throughout the day.

Plans are now under way to enlarge the scope of the truck units by the use of stake bodies which will handle barrels and other package goods and which will be handled by the trucks in a similar manner to the dump bodies. These bodies are now being fabricated.

One of the 80 rubbish stations at the Atlantic Refining Company's refinery at Point Breeze, Philadelphia. The portable dump body shown here is securely welded to the legs so that the entire unit is picked up by the truck

Three of these rubbish trucks operate at Atlantic's Point Breeze refinery. Here the truck is shown backing "under" one of the rubbish bodies. Once the truck is under the body, pressure exerted on a hydraulic cylinder lifts the entire body off the ground, about ten inches, so that it can be transported to the dump

At the dump, a second hydraulic cylinder is used to tilt the truck skids so that the contents of the body can be unloaded. Latches hold the body in place when being tilted

Why Drain Crankcases, And When?

By George A. Round*

REPORTS on fleet operations from many different sections of the country show a wide variation in crankcase draining practice ranging from what we would consider entirely too frequent changes to no draining at all.

Since those who are having trouble do not advertise it except to their suppliers, and those who feel they are saving a good deal by never draining are rather vociferous about it, a fair number have been led to believe that crankcase draining is a fallacious idea. Motor car and filter advertising have fostered this opinion to a considerable degree so the daily mail shows a fair percentage of inquiries on the subject, asking when and sometimes why. The answers given here represent an attempt to present the facts as the author sees them today.

Many Reasons for Periodic Changes

The oil industry, the automotive industry, and the general motoring public have heard much on the subject of crankcase drains the past year. With the car manufacturers showing a tendency to widen the period between drains, and the oil industry striving to hold the oil change recommendations within safe limits, the motorist is left with an uncertain mind as to the proper procedure to follow.

Much of the uncertainty has been quite effectively swept away by George A. Round, automotive lubrication engineer, Socony-Vacuum Oil Co., Inc., in this article, which offers the oil marketer a non-technical discussion of the behind-the-scenes reasons for periodic oil drains. Presented here in excerpt form, this paper was originally presented before the Metropolitan division meeting of the Society of Automotive Engineers at New York last winter.

This article presents factually the case for the oil change in a manner that is both logical and educational. Many of the points made by the author will be found good sales ammunition for the station attendant.

• WHY EVER CHANGE

If engines were lubricated by the "All-Loss" method of 25 years ago, there would be no need of draining — the oil passed over the bearings once —or perhaps a few times—and then was thrown away or burned up as fast as it came in. There was not much chance for contaminants to build up and cause trouble. Today a few quarts are put in the crankcase and more often than not, are expected to remain there indefinitely. Oil is bought (and sold) to last rather than to lubricate. At least most of the emphasis is on economy rather than overall results.

Under such conditions, there is ample opportunity for lubricating oil to become contaminated progressively with materials which may be formed or brought into the engine or produced in the oil as a result of use. These contaminants are:

1. Water
2. Soot
3. Lead Salts
4. Fuel Ends
5. Dust
6. Metals
7. Oil Decomposition Products

• WATER CONDITION SERIOUS

In the author's opinion, water in the crankcase represents the most dangerous type of contaminant. It can freeze and break an oil pump; it can emulsify with the oil and clog the lubricating system with disastrous results; it can mess up the inside of an engine so that nothing short of a tear down will make it run right. And, every time there is a fairly prolonged spell of cold weather, it does all of these things in a surprisingly large number of fleets, in spite of all the warnings that have been published.

Barring cylinder head gasket and block leaks, water gets into the crankcase through condensation of the steam formed by fuel combustion. For every pound of gasoline burned, slightly over a pound of water is formed as steam by the combination of the hydrogen in the fuel with the oxygen in the intake air. If the cylinder walls are cold, some of the steam condenses on them and is carried to the crankcase by the rings. Some steam undoubtedly gets there by direct blowby and may or may not condense, depending upon the degree of saturation of the crankcase atmosphere.

• WINTER SLUDGES

Under such conditions, water accumulates at an astonishing rate. For example, during the severe winter of three years ago, it was necessary to drain the crankcases of a fleet of city milk delivery trucks every third day—every 54 miles to prevent tie ups.

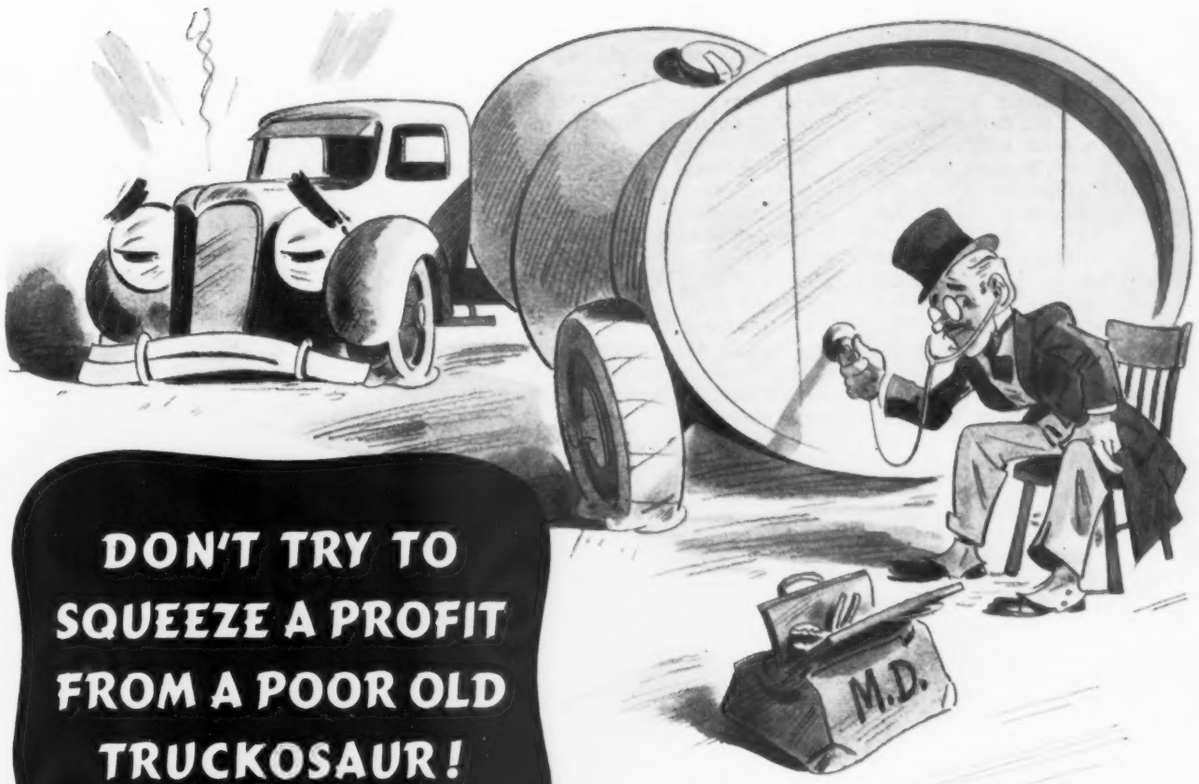
What happens in some cases is well illustrated by the analysis given in Table No. 1.

The used oil is rather light in body due to dilution; it contains considerable foreign material consisting of blowby carbon (soot), lead salts from the fuel, and iron resulting from rusting and wear. There is only a trace of oxidized material from the oil—it has been in service too short a time

TABLE 1
A Typical Water Condition, Oil Used 262 Miles

Used Oil Analysis		Crankcase Sludge	
Viscosity at 130° F.	106 Sec.	Oil—Soluble in P. E.	57.0%
A. S. T. M. Dilution	9.60%	Oxidized Oil, Soaps, Etc.	0.5
Insoluble Material	1.03	Carbonaceous Matter	5.5
Oxidized Oil—Soaps, Etc.	0.11	Water	37.0
Ash—Iron and Lead	0.44	Ash	2.0
Water	None	In Ash—Lead and Iron	

*Socony-Vacuum Oil Co., Inc., New York.

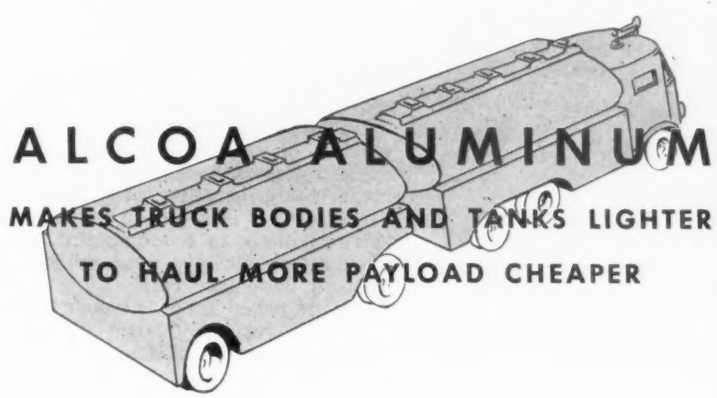


DON'T TRY TO SQUEEZE A PROFIT FROM A POOR OLD TRUCKOSAUR!

Like the dinosaurs of old, the "Truckosaur," the lumbering old truck with too much weight in the heavy material of its body, is doomed. Modern trucks have light bodies, light tanks, They carry more load. You get a bonus on your hauling-cost dollar.

Modern competition demands efficiency. Today internal conditions in every important industry are forcing a search for lower costs.

Truck tanks and bodies offer one easy way to meet the demand for greater efficiency. Light, strong alloys of Alcoa Aluminum reduce weight, make room for more payload, and cut hauling costs. There's a substantial number of related gains, too. (See the partial list at the right). Let us put full information on your desk.



ALCOA ALUMINUM

MAKES TRUCK BODIES AND TANKS LIGHTER TO HAUL MORE PAYLOAD CHEAPER

DO YOU KNOW THESE BONUS LOAD ADVANTAGES?

STRENGTH WITH LIGHTNESS results when you build with light, strong alloys of Alcoa Aluminum. The material itself is light, so sections can be made thick, stiff, and strong. We cooperate with tank and body builders to help you get the best equipment.

LONG LIFE — SALVAGE VALUE — Often Aluminum tanks and bodies outlast several chassis. Finally, as salvage, they return far more.

MAINTENANCE ON THE INSIDE—Aluminum alloys resist corrosion, and also do not catalyze the breakdown of oil products. Flushing-out is less frequently required.

MAINTENANCE ON THE OUTSIDE—Paint holds to Aluminum better, lasts longer, so units are more attractive.

ALUMINUM DOES NOT SPARK WHEN STRUCK.

COST — A per-pound or per-gallon breakdown of hauling cost reveals the reasons for using Aluminum. Usually the figures show that extra capacity cuts costs to the degree that savings pay the extra first cost in less than one year.

A FREE BOOK of case histories, showing experiences of users and what they have saved, is ready for you. Ask us to send "*Alcoa Aluminum for Truck Bodies.*" ALUMINUM COMPANY OF AMERICA, 2190 Gulf Building, Pittsburgh, Pa.

at too low temperatures for appreciable chemical change to take place.

Strangely enough there is no water in the main body of the oil. What has happened is that it has formed an emulsion—mayonnaise dressing—with a portion of the oil, carbonaceous matter—soot—lead salts and trace of oxidized oil acting as binders to hold the two liquids together. This is shown by the second analysis in Table No. 1.

The resulting mixture—sludge—has settled and centrifuged out of the main body of the oil, blocking the oil screen and causing a bearing failure. The major portion of the oil remained fairly clean—which emphasizes the importance of getting representative samples when studying complaints and the larger the samples the better.

• WHAT CAN BE DONE ABOUT IT

With present designs, some trouble from water accumulations is almost inevitable during any prolonged period of severe cold, especially in intermittent service. The use of high temperature thermostats (with permanent anti-freeze solutions) is a help. Radiator covers also aid because they keep some cold air off the crankcase but the oil reservoir is usually unprotected in any case. All crankcase ventilators should be checked to see that they are free and clear.

Oils for steam turbine service are highly resistant to emulsification but experience with them in fleet operation as well as in the laboratory, shows that they give no better service than high grade well refined motor oils. The reason is that soot and lead salts are powerful emulsifying agents which hold oil and water together. Hence, the real problem is to prevent water accumulation.

• EFFECT OF FILTERS

Just a few weeks ago a passenger car was fitted with a highly efficient crankcase ventilating system having a trap to catch everything coming out of the ventilator. This car was driven a distance of 150 miles in intermittent service during very cold weather, after which approximately one half pint of water was taken from the trap. Obviously, no filter could be expected to cope for long with such a situation.

The analysis shown in Table No. 2 indicates what erratic results may be encountered in a single fleet, with and without filters. Here two units of identical design are operating under similar service conditions, the filter equipped unit probably running colder. Obviously, the device was not taking care of the trouble and we would not expect it to—which is not a blanket condemnation of filters. They have their place.

TABLE 2

Erratic Results With and Without Filters

	Unit A With Filter	Unit B No Filter
Mileage since draining	**500**	**1500**
Viscosity at 210° F.	57 Sec.	55 Sec.
A. S. T. M. Dilution	12.00%	9.60%
Insoluble Material	0.60	0.21
Oxidized Oil, Soaps, Etc.	0.10	0.12
Water	21.50	None
Ash	0.23	0.52

In Ash—Lead and Iron.

It is the author's belief that trouble from water accumulations — except those due to direct leaks—can be overcome by providing adequate ventilation under idling, low speed and light load conditions. Means of doing this are now on test and the reports thus far are highly encouraging. This is important because the conditions which promote water accumulations also induce high wear while the damage and loss of time resulting from winter sludge trouble often are large expense items.

• SOOT

As already mentioned, this is the product of rich mixtures, especially in cold operation. Some is always formed during the starting and warm-up periods but with normal operation, there should be little of it and only a very small amount should reach the crankcase.

We know of no evidence that it causes wear or other damage except as it may act as an emulsifying agent to cause the winter sludge troubles already described. Ordinarily, an efficient filter will remove it from the oil as fast as it reaches the crankcase.

• LEAD SALTS

A common complaint these days is that crankcase oil turns gray or brown after a short period of use. This affects all types of oils including the darker colored ones, although the light colored oils—as always—show discoloration more readily. (A black spot always looks worse on a white shirt.)

This condition is due to the presence in the oil of lead salts from the combustion of leaded fuels. It is common experience to find combustion chamber deposits light gray or even nearly white in color due to the presence of these compounds so it is perfectly obvious that a small quantity must reach the crankcase. Every analysis of crankcase oil from engines using leaded gasoline shows this to be a fact.

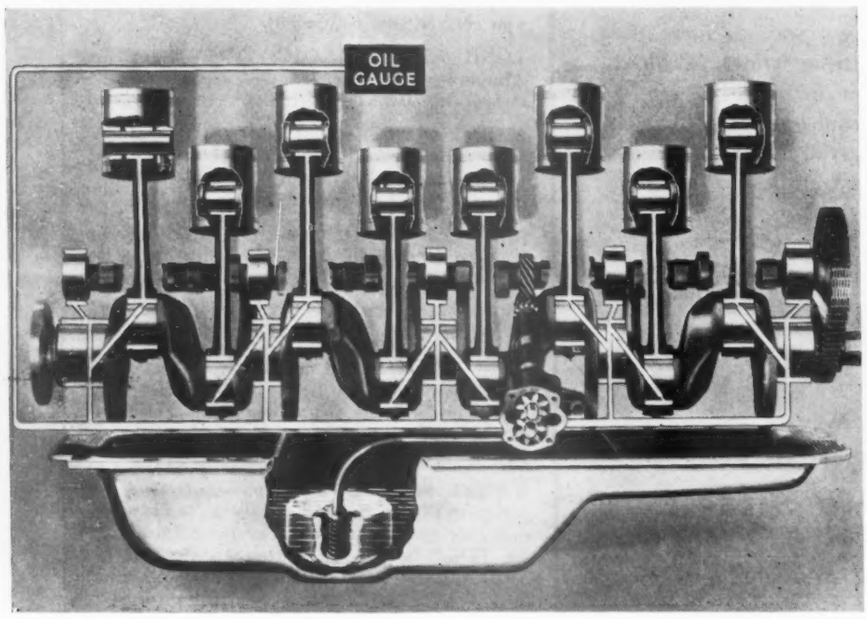
Careful study of many of these samples shows that as a general rule, some of the lead salts are sufficiently coarse to settle out of the oil if the sample is left standing. These are ordinarily taken out by oil filters. However, some of the lead compounds are so finely divided that they cannot be filtered even with laboratory equipment and these are largely responsible for the brownish color of the used oil. Some of the lead may also be dissolved in the oil. There is no evidence that the lead does any harm other than adding to the amount of crankcase dirt and aiding in emulsion formation when water is present.

• DILUTION

With modern engine designs, dilution of the oil rarely causes trouble. In fact, most passenger car manufacturers recommend diluting S.A.E. 10 motor oil up to 10% or more with kerosine to assure cranking at temperatures below minus 10°F.

There are several reasons why fuel thinned oil can be used in present day engines. First, we have oil pumps with adequate capacity to keep the bearings full even with hot badly diluted oil. Second, the bearing clearances have been reduced so that end leakage is greatly lessened and what is more important, the load carrying ability of the oil film is increased. Reducing clearance has exactly the same effect as increasing viscosity. Third, modern piston design and ring equipment is less sensitive to oil viscosity variations—at least in the range where there is likely to be complaint. Even the lightest oils give good mileage, at least in passenger cars.

On the other hand, if bearing clearances are relatively large and if the oil pump has insufficient capacity to keep the bearings full and maintain proper oil pressures, failures may occur from lack of lubrication or from bearings pounding out. This was the



A study of the path of lubricating oil through a modern engine is argument enough for the need for clean lubrication. This is a diagram of the 1938 Pontiac force feed lubrication system. White lines indicate drilled oil passages

NOW

the under-the-hood battery you can't overfill

guarded by Exide's NO-OVER-FLO

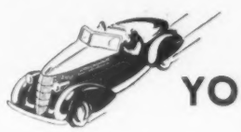
HERE is a new under-the-hood Exide that can't be overfilled with water. Overfilling leaves insufficient space in a battery for acid expansion. When the car generator is charging, battery acid expands due to heat and gas bubbles—may overflow if too much water has been added. Flooding acid may cause damage to expensive engine parts under the hood. But the new Exide No-Over-Flo Battery cannot be overfilled—cannot overflow acid.

In addition, this is an extra-capacity battery, for those far-sighted car-owners who want to enjoy their radios, heaters and defrosters, and at the same time be assured of dependable starting under all conditions.

You can give them what they want, with this new Type XS-192E Exide Hycap. It will crank faster, when almost totally discharged, than the rigid S.A.E. standards require for a fully charged battery. It has from 26% to 42.8% more plate area, and will crank from 32.5% to 77.7% longer.

Naturally, you'll want to know more about this remarkable new battery, and Exide's change-over plan. Your Exide Wholesaler can give you full details—get in touch with him, or write to us.

THE ELECTRIC STORAGE BATTERY CO., Philadelphia
The World's Largest Manufacturers of Storage Batteries for Every Purpose
Exide Batteries of Canada, Limited, Toronto

WHEN IT'S AN EXIDE  **YOU START**

condition not so many years ago. Then too, diluted oil usually burned up fast and sometimes led to complaints of poor economy. On the other hand, sometimes the fuel ends accumulated fast enough to cause the oil level to increase.

One thing is certain; close clearances and low viscosity oil put a premium on oil cleanliness. Dirt and dust can aggravate wear under these conditions and this is where filters are distinctly helpful.

Dilution conditions should not be disregarded, however, because they are a definite indication of something wrong, and possibilities for trouble elsewhere than in the crankcase. Cold operation, leaking fuel pump diaphragms, defective automatic chokes and carburetors out of adjustment are things to look for if dilution becomes apparent.

• ROAD DUST

During the dust storms of recent years, there was ample proof that engines could be ruined in short order by the conditions which prevailed, even when equipped with air cleaners. Granted that these were extreme cases, the fact remains that it has proven wise to use large and highly efficient air cleaners when operating under normal conditions in the middle west and where hard surfaced roads are the exception not the rule.

How much bearing wear is caused by dust is difficult to say but in any event most of this dirt must pass the rings and cause wear there before it reaches the crankcase. Hence the carburetor air cleaner must be depended upon very largely for protection from this contaminant. Oil filters will help, of course, particularly with material coming in through the breather. Here again we would like to emphasize the need of regular cleaning of air cleaners in breather intakes.

• METALS

Crankcase oil analyses almost invariably show the presence of metals, chiefly lead and iron. Where aluminum pistons, copper lead bearings, etc., are employed, traces of these metals will also appear in the ash.

The effect of lead compounds in the oil has already been discussed. How much wear is caused by the other metals is difficult to say; we are more inclined to feel that their presence in the oil is the result of wear, not the cause of it. A good reason for believing this is the fact that iron is usually present as iron soaps rather than as metallic iron. Iron oxide from rusting is also present.

With these facts in mind we do not believe that any one method of keeping metals out of the oil is effective. A filter will undoubtedly remove suspended but not dissolved metals.

• OIL DECOMPOSITION PRODUCTS

When oil is subjected to high temperatures (over 250°F.) in the presence of air, it tends to oxidize. This action is enormously accelerated by the presence of metals which act as catalysts. If temperatures are high enough, the oil will also crack.

Cracking produces carbonaceous insoluble materials. Oxidation results in the formation of a wide variety of compounds ranging from acids soluble in the oil to insoluble asphaltic materials and lacquers. The exact nature of these is difficult to determine and the type or types formed in any given case depends upon a great many factors including engine design, operating temperatures, character of oil and length of time it is used.

When the word "acid" is used, there is an involuntary feeling on the part of many that corrosion will inevitably occur. This has been inferred in connection with the use of acids in oil refining as well as their development in service. However, actual corrosion troubles have been small in number.

• PREVENTING CORROSION TROUBLES

The active acids from oxidation appear to be harmful only to the cadmium alloys, copper lead and hardened lead bearings. The base babbitts are not attacked, neither are steel, aluminum or other engine metals. Since high temperatures and certain metals alone are involved, it is obvious that the condition is controllable through design. However, as loads are stepped up, there is more need for the harder bearing metals and more chance for trouble. Hence, other means for preventing corrosion are desirable and have been provided by some of the major oil companies.

• ASPHALTIC MATERIAL

In addition to forming acids of various types, oil oxidation also produces a wide variety of materials commonly called sludge which range from partially oil soluble plastic materials to coke-like resins. One engine in particular used in heavy service throws down a granular carbonlike material, most of which is too coarse to go through the oil screen and be picked up by the filter. It merely piles up until there is enough to block oil flow to the pump. It also adheres to the sides of the oil reservoir in layers.

• WHERE FILTERS ARE HARMFUL

Under certain conditions of temperature, an insoluble lacquer or varnish-like material may be produced by oxidation. This forms a thin coating on connecting rods, valves and piston reliefs, particularly in aircraft and diesel engines. Such deposits may interfere seriously with engine performance.

To prevent these, particularly in diesels, addition agents of various types have been added to engine oils. Unfortunately, however, they are removed by certain types of filters, especially those containing neutralizing agents. In fact, such filters have an unfavorable effect on addition agents generally. Hence, they should not be used with the special oils which have been developed to meet the peculiar requirements of some types of engines.

• WHEN SHOULD CRANKCASE OIL BE CHANGED?

In the author's opinion, there is only one sure answer to this question, namely "It depends upon many things". In view of what has been said previously, perhaps there is better appreciation of why this is so.

• SUMMARY

With cold operation and water actually collecting, very frequent draining may be imperative to prevent serious damage. Oil cost is negligible in comparison with the expense of repairs and loss of service of the vehicle resulting from failure to drain often enough under this condition. The same may be said of bad dust conditions.

The presence of lead deposits and soot is not especially objectionable and ordinary filters will keep the accumulations to a safe figure if properly serviced. The same holds true for metals in the oil.

The possibility for trouble from oil oxidation depends upon the service, the engine and the oil and only a study of the individual case will enable one to say when to drain. The same unit in different services will often present entirely different problems and require different oils, different draining practice and filter changes.

After all, lubricating oil represents a relatively small item spent as insurance against wear, depreciation, service troubles and loss of operating time. As usual, the premium is a very small percentage of the potential value of the policy. Hence, it is decidedly worth while to study all factors before deciding what to do in any individual operation.

"Make A Date" For Spring Change-Over

CHICAGO, March 19.—Pure Oil Co.'s. 1938 spring change-over campaign will be the "Make A Date" theme linked to the company's "bumper-to-bumper" plan of marketing lubricants and accessories.

The "Make A Date" theme was used in the 1937 fall change-over campaign and the success of that campaign resulted in the company continuing the theme into this spring.

New advertising and sales promotion literature has been devised to support the theme, the company's retailers were informed with announcement of the spring campaign in the current issue of the Pure Globe, company house organ.

The theme phrase is to sell motorists on "making a date" with their Pure Oil retailer to bring in the automobile for the spring change-over.

"Bumper to bumper" service has been featured by Pure Oil for five years. The service is a thorough check of the automobile, from bumper to bumper, as to the cars needs in lubricants and accessories.

"BEST HOSE WE EVER USED"

Synthetic Tube-Rubber Covered Underwriters' Approved

IT'S unanimous! Everyone who has tried Goodyear's Style B. H. Synthetic Tube Rubber-Covered Gasoline Hose says it is the best hose built because of these standout features:

LIGHTER WEIGHT—EASIER TO HANDLE

NON-KINKING—FAST DISCHARGING

RESISTS ABRASION—NEEDS NO PROTECTORS

RESISTS CRUSHING—FEWER ACCIDENTAL FAILURES

GOOD LOOKS—DOESN'T SOIL OR STAIN

LONGER WEAR—LOWEST ULTIMATE COST

Why not try a length and see for yourself—you'll be surprised at the big hit it makes with your men. The G.T.M.—Goodyear Technical Man—will be glad to give you complete particulars. Just write Goodyear, Akron, Ohio, or Los Angeles, California.

SEE HOW IT IS BUILT

GOODYEAR STYLE B. H. GASOLINE HOSE is made with the highest quality synthetic tube and a tough abrasion-resisting black rubber outer cover. It is reenforced with *three* braids of high tensile cotton cords that give great strength and flexibility. The middle braid is woven with a strand of braided copper wire to provide a static bond.

THE GREATEST NAME IN RUBBER

GOODYEAR

STYLE B.H. GASOLINE HOSE

Automotive NOTES AND COMMENTS

By JOHN W. THOMPSON
N. P. N. Staff Writer

To diesel or not to diesel may not be the question for very long, think some of the "consulting" engineers in the Detroit district. Ever since General Motors, in no uncertain terms a few weeks ago, announced its entry into the diesel field with a wide and varied array of sizes, rumorists have been busier than a trap drummer with four sticks.

If you stand on the southwest corner of Woodward and Griswold Streets, you will hear that this diesel announcement by GM is just a prelude to their entry into the diesel-powered passenger car field. But if you cross over to the northwest corner, you'll find the diesel talk a little discouraging as far as its use in your car and mine are concerned. Here it appears that the sales obstacle might prove to be a shin-buster to the be-sure-your-car-is-equipped-with-a-smokeless-and-odorless-diesel-engine movement.

Then go over to the northeast corner and, if you're lucky, you'll find a General Motors man who will deny everything and tell you that no immediate adaptation of the diesel to passenger car use is planned.

But on the southeast corner you may find some consolation; for in the drug store on that corner they serve a very special blue plate luncheon on Monday, Wednesday, and Friday.

Nevertheless, many believe that GM, by its diesel announcement, has brought this type of engine and the passenger car much nearer a speaking acquaintanceship. Some observers bring up the question of providing adequate fuel supply facilities and equipment for servicing cars powered by diesels.

On this point it can only be said that the King can do no wrong, and that if GM cannot get fuel distribution in one way, it will get it in another. After all, Ethyl got around, didn't she?

* * *

You probably know by now that practically all the five-figured sales and merchandising specialists will tell you reasons why people buy are founded on a number of motives, such as desire, knowledge, fear, etc., etc.

But we can't help feel that a bow should go to someone in the Exide Battery organization for the following back-to-earth reasons why people buy from you. Here are a few:

BECAUSE. . . . .

they like the shape of your nose.
your ears remind them of their father's.
you have a nice wife.
they sympathize with you because you don't have a nice wife.
you were seen in a tap room.
you are against booze.
you made a mistake and forgot to charge for the oil.
your toilet was handy on a certain cold night in January.
you are a democrat.
you are a republican.
you were seen one morning about to enter a church.
your little boy goes to the same school as their little boy.

And of course, they buy from you also because you sell Zingo Gas which brings a new meaning to the word "Economy," and gives that added power and pick-up on the hills. And then, there's our Zingo Motor Oil, but you wouldn't believe what we say about it —its that phenomenal.

* * *

The latest Ford rumor, which incidentally has spread faster than the Dipsy-Doodle, was said to have been started on its way by one Walter Winchell, the squibbler. It concerns the possibility of Ford owning all the cars he makes and then offering them to the public on a rental basis.

If memory serves correctly, this same whopper was held up in plain view about five years ago and did pretty well from a publicity standpoint then, too. They say that there was a rumor around a few months ago to the effect that Ford was going to include an egg poacher on his cars as optional equipment, but the idea fell through when a survey revealed that most Ford owners were allergic to poached eggs.

* * *

Each year, along with the mumps, chicken pox, and measles, comes the usual crop of predictions as to the characteristics of next year's cars. It seems quite generally agreed that 1939 will see some important mechanical changes which can readily be transformed into advertising copy. Body designs are expected to undergo further beauty treatments, with some plans calling for a further dissolving of radiator grilles into hood contours, and practical elimination of the running board as far as its practical use is concerned.

If it is necessary that you maintain your standing as a tea leaf reader on new car developments, you will be quite safe in saying that bodies will be roomier, and that engines will become smaller without losing any horsepower. The latter will, of course, be of passing interest to the oil industry.

Chief engineer D. E. Anderson, of the Bohn Aluminum and Brass Corp., makes the point that designers have learned how to design roomy bodies for comparatively short wheelbase cars and that, with the big volume market ranging from 110 to 115-inch wheelbase, we are likely to see some new products in this field. He adds that, as there are no power plants available for this type of car at the present time, we can expect some entirely new designs.

* * *

Anderson says that most of our present engines are transitions which have been modified, refined and developed from year to year but which have not been fundamentally changed. He believes that with our present knowledge of combustion chamber design, combustion control, better fuels, and improved carburetion and fuel distribution, that more horsepower per dollar is "in the wind."

* * *

Henry Ford was recently granted a patent on a vacuum-operated booster device which permits a "feather" touch of the feet to operate the clutch or brake pedal. According to reports, the device may be so operated that when the driver takes his foot off the accelerator, the clutch is automatically disengaged, thus operating the car on a free-wheeling basis. Then, when the accelerator is again depressed, the car is automatically put back into gear.

* * *

The Dodge division of the Chrysler Corp., among others, is advocating that cars be "unsalted" now that winter is about to go into cold storage. The calcium chloride and rock salt which is thrown on many city streets throughout the winter to melt the ice and snow, can cause untimely corrosion on the under parts of the car if permitted to remain on too long.

So Dodge recommends, in addition to a good cleaning, a thorough lubrication job to offset any possible deterioration which might be setting in from the action of these chemicals.

So why not start now on an "Unsalt Your Car" campaign, and ask everyone you meet if he has had his car unsalted. You'll be surprised at the number of salted cars in your own community. Be known throughout your territory as the leading car-unsalter. Big profits at nominal cost. Send for our free booklet, "Herman, the Laundryman," which explains all about everything.

* * *

In the previous installment of Automotive Notes and Comments we promised you "Bertha, the Sewing Machine Girl" for this issue. For next issue we promise "The Drunkard," with free samples.

DETROIT HANDS JOBBERS GREAT NEW BUSINESS!

LAST year—the first big year for hypoid gears—millions of pounds of extreme pressure lubricants were sold. A considerable part of the business was on branded products of the car makers—handled, by their direction, through their service departments.

But experience has shown car manufacturers that this precaution is no longer necessary, that certain extreme pressure lubricants marketed by jobbers meet all requirements.

Chief among these lubricants in volume of sales is Penola Expee Compound. It more than meets every specification. It resists oxidation, flows freely at sub-zero, undergoes extreme cold without precipitation . . . requires no stirring before use.

Penola Expee has been sold and used for hypoid gears for over four years. It has gained tremendous acceptance—under its own or private label it outsells all others by a wide margin.

Team up with this successful experience. Get your share of this great profit opportunity. Write Penola today!

Sold under its own or private label

PENOLA EXPEE COMPOUND

PENOLA INC.

30 ROCKEFELLER PLAZA NEW YORK CITY

FORMERLY PENNSYLVANIA LUBRICATING CO.

New Models are Station's Best Gasoline Customers

CHICAGO

A SLEEK Whoseits car of current model grinds to a stop at the gasoline pump. The driver calls out for a tank full of gasoline. A few minutes later the next customer rolls in. This time it is a Whatsits car, of 1931 vintage, not so sleek and in fact rather dingy and the worse for wear in some spots. The driver also orders a tank full of motor fuel.

Which car is the best gasoline customer of the station?

To the man making a sale in the service station, to the man refining gasoline or producing the crude oil, a sale is a sale. The motorist buying the most gasoline for cash, or on excellent credit, is the best customer regardless of the equipment driven. Yet, there is another aspect to the "industry's best customer."

Statistics of the industry have been under analysis in arriving at the average gasoline consumption per motor vehicle per year. A favorite method is to break down the total gasoline consumption of a city, county or state over a given period into the number of automobiles registered in that area. This consumption produces a figure of the average consumption for the period.

Another version concerns the average miles driven per automobile per year. An arbitrary figure is taken, usually 15 miles per gallon, as the average for all cars, regardless of make or age or the use of the automobile. The average miles per gallon times the average number of gallons consumed produces the average number of miles the average car travels over a given period.

In these estimates an automobile, regardless of age, is considered as an individual unit. Hence, the final average figure is applied to each car whether fresh off the assembly line and driven many miles daily or whether the car is an older model that never gets far from the home garage.

To determine what mileages are run off an automobile's speedometer in relation to the age of the car, the Ethyl Gasoline Corp's. Chicago office last year made a case study of numerous automobile mileage records. The results show the comparative average mileages of various automobiles, and in turn whether a new or old automobile represents the petroleum industry's better customer.

Mileage for Cars of Various Makes and Ages, as Computed from Ethyl Gasoline Corp.'s Survey

Make	Number cars surveyed	Estimated annual mileage	Estimated average annual mileage
Chevrolet	152	2,515,361	16,548
Ford	58	1,283,559	22,140
Plymouth	12	218,671	18,222
Pontiac	94	1,660,567	17,666
Dodge	59	1,038,023	17,593
Oldsmobile	97	1,988,264	20,497
Buick	252	4,590,166	18,215
TOTAL	724	13,294,611	18,363
1933 Models			
Chevrolet	17	165,782	9,752
Ford	2	7,811	3,905
Pontiac	73	722,116	9,892
Oldsmobile	25	262,398	10,496
Buick	107	1,170,007	10,934
TOTAL	224	2,328,114	10,394
1930 and Older Models			
Chevrolet	2	12,994	6,497
Pontiac	30	191,332	6,378
Buick	85	552,354	6,498
TOTAL	117	756,680	6,467

In arriving at a comparison of mileage between new and older models, three age periods were studied. For new models the study was on 1936 cars, the latest model on the highways at the time the survey was made for which records would be available. For middle age vehicles 1933 models were in a second group. For older cars models of 1930 or an earlier date were in a third group.

Records were studied in the service departments of automobile dealers in four midwestern cities, Minneapolis, Indianapolis, Detroit and Chicago. Various makes of automobiles were included, to provide a cross section, from the lowest priced class through the Buick.

The study was made on service department shop tickets. An automobile, to be included in the study had to be in the service department at least twice, thus cars on which there was only one shop ticket were eliminated.

Data taken from both work tickets was the date of each trip to the service department and the two mileage readings. By matching the second shop ticket against the first, actual data was obtained on the number of days between trips and the mileage covered during this period.

The total mileage figure was reduced to the average miles driven per day during the period, then the computation by NATIONAL PETROLEUM NEWS was made on the estimated annual mileage for each automobile in the study. A final tabulation grouped all makes of automobiles within each of the three age groups, to arrive at an estimated annual mileage for each age.

The final computation involved 1065 automobiles with an estimated annual mileage of 16,379,000 miles.

Of the three age groups of 1936 models showed the greatest number of estimated miles per year, 18,363. Lowest estimated mileage by makes was for 152 Chevrolets, at 16,548. The highest was Ford, with 58 cars showing 22,140 miles. One other make, Oldsmobile, showed more than 20,000 miles annually.

While the study showed new model cars, as representative of an age classification, to be the best customers of the industry, the middle age group ranked second. The 224 automobiles, of five different makes, in the 1933 models showed an estimated average annual mileage of 10,394 miles, or about 56 per cent of the 1936 model figure.

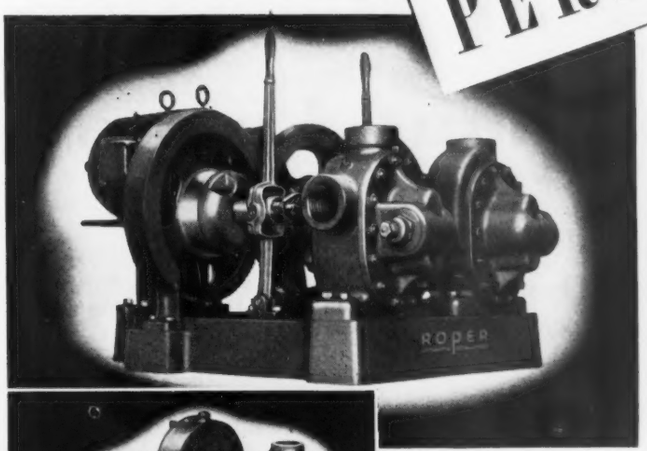
Four makes in the 1933 group clung close to 10,000 miles per year. The fifth make, with two automobiles studied, showed an average of only 3905 miles per year.

The oldest automobiles in the study, 1930 models or older, showed an estimated average annual mileage of 6467

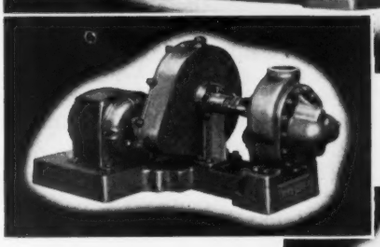
(*Continued on page* 48)

★ To qualify as smooth performers both equestrienne and steed must have perfect coordination, absolute balance and indefectible rhythm to successfully scale the barrier.

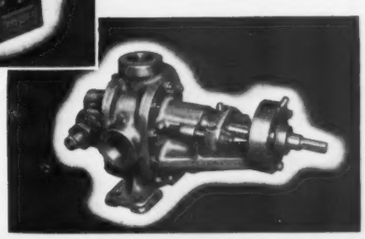
Smooth PERFORMERS!



Twin Pump Unit



Single Pump Unit



Truck Pump

★ Good pumps also require perfect coordination, absolute balance and indefectible rhythm . . . otherwise they are not good pumps. Any pump not having these qualities will thrash itself to pieces long before its time. To be sure of smooth performers, why not put your faith in pumps that have licked every conceivable kind of job for over 80 years . . . pumps that are bear-cats for work and long life . . . pumps you can rely on always! Roper Pumps have exactly that record and reputation . . . use them in your bulk plants and on your tank trucks.

GEO. D. ROPER CORP., ROCKFORD, ILL.

Write for

BULLETIN N-278
FOR DETAILS AND PRICES

ROPER *Rotary* PUMPS

DEPENDABLE - SINCE 1857

Loading fuel oil at the Hastings, N. Y., water terminal of the E. Robison Oil Co. Notice the operator watches the meter, and not the compartment, while loading

Correct Use of Meters Holds Down Plant Losses

By John W. Thompson
N. P. N. Staff Writer

THERE IS MORE to the use of meters by oil companies to reduce plant losses than simply installing the equipment. The plant operators generally have to be shown how to make the correct use of the equipment and the meter company representatives spend a good deal of time after the sale and installation has been made, to make sure that, from the plant head down, the functioning of the equipment is understood.

For example, where trucks are loaded through meters at a bulk plant, it often happens that the operator on the loading rack, instead of loading the compartment by the meter dial, continues to watch the level in the truck compartment and shuts off the flow when the compartment is "full". Assume the compartment to be calibrated for 200 gallons, but in watching the liquid level instead of the meter, the operator puts in 205 gallons.

True, the meter will register 205 gallons, but when the truck driver makes his delivery of that compartment, in the absence of a meter on the truck, he dumps 205 gallons. However, he bills it to the customer as 200 gallons, for he knows that is what the compartment holds. Thus five gallons is lost on that one compartment delivery alone, simply because the operator at the loading rack filled it by eye instead of by meter.

At the fuel oil water terminal of the E. Robison Oil Co. on the Hudson River at Hastings, N. Y., errors and losses through loading tank trucks are reduced to a minimum by the simple loading rule of watching the meter instead of the level in the tank compartment.

At this plant, meters are used on the truck loading rack to record the quantity of products taken out by the truck, and in addition all trucks are equipped with meters so that the delivery to the customer's tank is also accurately measured.

As a constant check against errors in loading and delivery of fuel oil, the storage tanks at the Robison plant are gauged each day with a steel tape and checked against the meter readings on both the loading rack and the trucks.

In operation just a little more than a year, this plant is a happy combination of good housekeeping and modern equipment.

The company receives its products from the supplier's terminal at Staten Island, N. Y., by barge. There are three unloading lines running from the dock to the tanks, one being a 4-inch diameter and the other two 6-inch. The pump on the barge is used for unloading into storage tanks.

The plant has five tanks, with a combined capacity of 1,450,000 gallons. Two tanks hold 500,000 gallons each, and three have a capacity of 150,000 gallons each. The two large tanks are used for No. 2 fuel oil during the heating season. All tanks are equipped with flame arresters, and the 150,000-gallon tank holding No. 1 oil is supplied with a pressure-vacuum relief valve.

Each tank is equipped with an emergency valve which automatically closes the lines leading to the tank in case of fire. Surrounding the nest of tanks is a four-foot cement block wall.

Six-inch lines lead from the two large tanks holding No. 2 oil to the pump house, while four-inch lines are used from the smaller tanks.

Inside the fireproof pump house is

To Top Executives in the Oil Industry

THERE is a great difference between being *well dressed* and merely "well fitted". Almost anyone who can wield needle and iron can make you a suit that "fits". Only a real artist, endowed by instinct and training with a sense of proportion and perspective, can properly express *your* personality and bring out your salient characteristics in a suit of clothes. ¶ Successful men know the false economy of penny-pinching on appearance. A suit custom-tailored by us for you—and you alone—is an investment in good taste, comfort and enduring quality that pays dividends in personal satisfaction far exceeding the initial cost. ¶ We extend you a cordial invitation to visit us the next time you are in New York...or to write for the date on which our representative will visit your city.

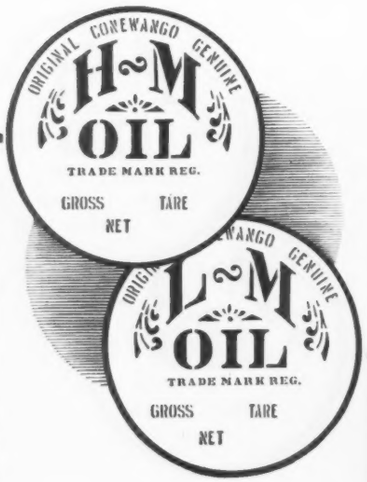
SACK SUITS . $150	*DINNER SUITS* . $195
TOPCOATS from $165	*FULL DRESS* . . . $215

GRAY & LAMPEL
INCORPORATED

Sporting and Mufti Tailors • Breeches Makers

18 EAST 53rd STREET • NEW YORK CITY

Our Mr. Ebenezer Steer visits the principal cities of the Middle West. Dates on application.

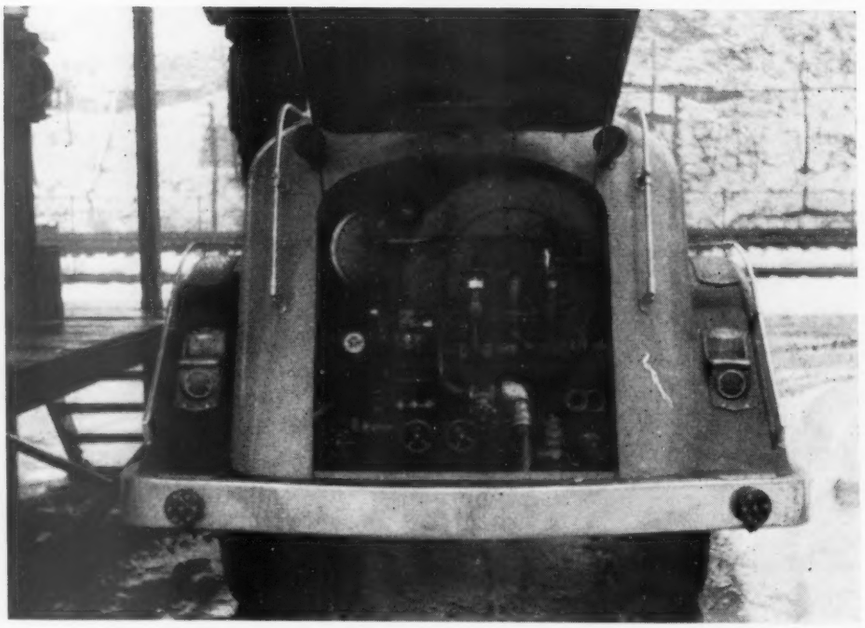


The Accepted Standards of Pennsylvania Bright Stock Excellence Since 1900

H-M and L-M Oils Are Made Solely By

THE CONEWANGO REFINING CO.

Warren, Pa.



The "business end" of one of the Robison fuel oil trucks. All of the company's trucks are equipped with meters, 150 feet of hose on a reel, and an additional hose length of 20 feet for short distance delivery

one room devoted to pumps and another which houses the foam generating equipment connecting to all the tanks and to the dock. In addition to the foam system, carbon dioxide fire extinguishers are conveniently located on the loading rack, on the trucks, and in the plant office.

In the foam generating room, the tank layout of the plant is painted on the wall directly in front of the valve manifold which directs the foam to any desired tank. Each valve is tagged with a number to correspond to the tank number on the wall, so that no confusion will result in case of an emergency.

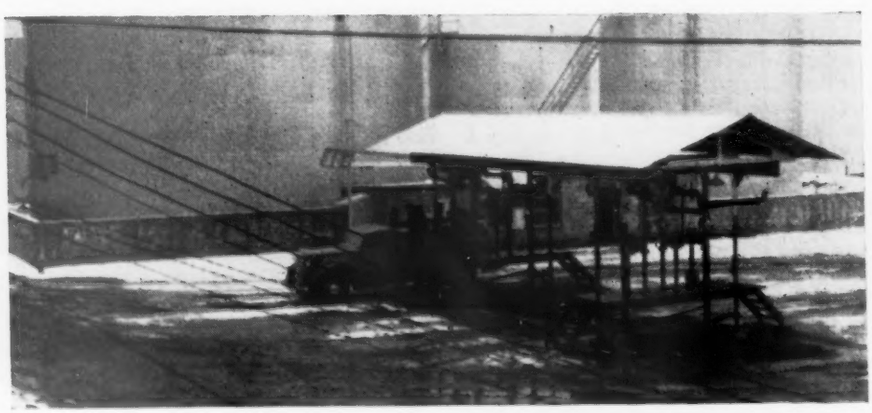
In the pump room there are four centrifugal pumps each individually connected directly to explosion-proof electric motors. A 5-horsepower motor drives a 300-gallon per minute pump, while each of three 150-gallon per minute pumps is powered by a 3-horsepower motor. All wiring runs through conduits, and switches and light fixtures are vapor-proof.

All piping throughout the plant is above ground, and in some cases rests on pipe supports. Pipe joints, in every possible case, are welded, and as many 90-degree turns are eliminated as possible.

The pumps may be by-passed if it is desired to load trucks by gravity, and connections are provided in the pump house whereby a flexible hose can couple two pump lines and pumping be done from one tank to another.

Outlets are also provided outside the pump house for pumping out truck tank compartments.

From the pump house, four-inch lines lead to two uprights at each of two loading platforms. At the tops of each of these uprights two three-inch lines lead to fill pipe outlets through new type slow closing valves and counterweighted slip joint fill pipes. One four-inch and three three-inch meters are used at the loading racks. The main office of the Robison company is in Hartsdale, N. Y.



View of the truck loading rack and 1,450,000-gallon storage facilities of the E. Robison Oil Co. water terminal at Hastings, N. Y., on the Hudson River

New Patents

Compiled by R. E. Burnham, patent and trademark attorney, 511 Eleventh Street, N. W., Washington, D. C., from whom copies may be obtained at the rate of 25c each. State number of patent and name of inventor when ordering.

January 25, 1938

REFINING

Production of high quality lubricating oils—Hermann Zorn and Walter Rosinsky, Germany, assignors to I. G. Farbenindustrie. Filed Oct. 4, 1933. No. 2,106,232.

Process for solvent extraction of oils—Ulric B. Bray, Palos Verdes Estates, Calif., assignor to Union Oil Co. of Calif. Filed Feb. 19, 1934. No. 2,106,234.

The following for processes for breaking petroleum emulsions to Tret-O-Lite Co. assignee of the inventors.

Melvin De Groote, St. Louis, Mo., filed Mar. 17, 1937. No. 2,106,239.

De Groote and Bernhard Keiser of Webster Groves, Mo. Filed Apr. 2, 1937. No. 2,106,240.

De Groote—Filed Apr. 10, 1937. No. 2,106,241.

De Groote—Filed June 21, 1937. No. 2,106,242.

De Groote—Filed June 21, 1937. No. 2,106,243.

De Groote—Filed June 21, 1937. No. 2,106,244.

MISCELLANEOUS

Method of testing lubricants—Frederick A. Faville, Chicago, Ill. Filed Apr. 20, 1936. No. 2,106,170.

Lubricants and methods of manufacturing same—Anthony H. Gleason, Elizabeth, N. J., assignor to Standard Oil Development Co. Filed June 21, 1932. No. 2,106,247.

Process for preparing halogenated organic hydroxy compounds — Siegfried L. Langedijk, Amsterdam, Netherlands, assignor to Shell Development Co. Filed July 21, 1932. No. 2,106,352.

Continuous method of reacting liquid reagents—Richard M. Deanesly, Berkeley, Calif., assignor to Shell Development Co. Filed Sept. 9, 1935. No. 2,106,521.

Lubricating oils—Bert H. Lincoln and Alfred Henriksen, Ponca City, Okla., assignors to Lubri-Zol Development Corp. Filed June 22, 1932. No. 2,106,554.

Apparatus for determining the dew point of a vapor product—Robert F. Denison, Mount Vernon, Ill., and Wendell P. Hawthorne, Augusta, Kans., assignors to Socony-Vacuum Co. Filed May 5, 1936. No. 2,106,593.

Motor fuel composition—Will R. Savage, Omaha, Neb. Filed July 31, 1934. No. 2,106,661.

Gasoline dispenser—Charles Pieuthner, Buffalo, N. Y., assignor to Martin & Schwartz, Inc., same place. Filed June 26, 1936. No. 2,106,679.

February 1, 1938

REFINING

Method of catalytic hydrogenation of crude benzene derivatives—Marion H. Gwynn, Bound Brook, N. J. Filed Sept. 17, 1932. No. 2,106,735.

Process for producing a hydrocarbon fluorescent product—Lloyd B. Smith, Moorestown, N. J., Standard R. Funsten, Rosemont, and Hugh W. Field, Glen Mills, Pa., assignors to Atlantic Refining Co. Filed Sept. 23, 1933. No. 2,106,767.

Production of highly viscous oils—Mathias Pier and August Eisenhut, Germany, assignors to I. G. Farbenindustrie. Filed June 13, 1935. No. 2,106,960.

Centrifugal dewaxing of oils—Alfred A. Wells, Roselle Park, N. J., assignor to Standard Oil Development Co. Filed June 14, 1934. No. 2,106,964.

Method for separating waxy constituents from oils—Garland H. B. Davis, Elizabeth, N. J., assignor to Standard Oil Development Co. Filed Apr. 28, 1934. No. 2,106,969.

Hydrogenation of high oxygen coal—Carleton Ellis, Montclair, N. J., assignor to Standard-I. G. Co. Filed Apr. 13, 1931. No. 2,106,973.

Neutralization of acid treated oil—John McA. Harris, Jr., and Norman F. Black, Baton Rouge, La., assignors to Standard Oil Development Co. Filed Dec. 17, 1935. No. 2,106,976.

Process of solvent dewaxing oils—Hendrikus van der Waerden, The Hague, Netherlands, assignor to Shell

Birdies
CHIRP CHIRP
. . . IN THE SPRING
CHIRP CHIRP -- on one hand, the cheerful message that SPRING IS HERE; but on the other, a blues' song of FRICTION and WEAR.
To the lubrication expert, we say "dag" colloidal graphite is a "natural" in meeting and overcoming the birdies who will feather their nests in car and truck chassis and springs in the days ahead; and who with their incessant chattering will be not only extremely annoying, but cause actual damage.
Plain oils alone do not serve effectively as spring spray oils because they must sacrifice their lubricating properties in order to gain penetrating qualities. With "dag" colloidal graphite added, the liquid acts merely as a carrier for the graphite. Capable of entering the finest openings, colloidal graphite -- unlike the powdered variety -- is not filtered out. Long after the carrier has evaporated, dry, long-lived lubrication remains.
A spring spray oil that contains "dag" colloidal graphite assures many more squeak-free miles of driving to the owner; and, as a direct result, gives an oil supplier a product that builds business and goodwill through positive performance.
ACHESON COLLOIDS CORPORATION
PORT HURON MICHIGAN
dag
COLLOIDAL PRODUCTS
ACHESON COLLOIDS CORP., PORT HURON, MICH.
Please send gratis, story on "dag" Colloidal Graphite.
NAME .....
ADDRESS .....

Development Co. Filed Apr. 8, 1935. No. 2,107,064.

Dewaxing lubricating oils—Chester E. Adams and Frederick W. Sullivan, Jr., Hammond, Ind., and John A. Anderson, Chicago, Ill., assignors to Standard Oil Co. (Ind.). Filed Nov. 1, 1933. No. 2,107,137.

Mineral oil distillation—Wayne E. Kuhn and Lebbeus C. Kemp, Jr., Port Arthur, Tex., assignors to Texas Co. Filed May 28, 1934. No. 2,107,156.

Process of converting hydrocarbons in the vapor phase—Myron W. Colony, Los Angeles, Calif., assignor to Petroleum Conversion Corp. Filed Aug. 26, 1933. No. 2,107,235.

MISCELLANEOUS

Process of producing alcohols from alkyl sulphuric acids—William H. Shiffler and Melvin M. Holm, Berkeley, and Marvin F. Miller, Albany, Calif., assignors to Standard Oil Co. (Calif.). Filed Aug. 22, 1930. No. 2,106,877.

Motor fuel composition—Franz R. Moser, Amsterdam, Netherlands, assignor to Shell Development Corp. Filed May 11, 1935. No. 2,107,059.

Process and products relating to recovery of alcohols from hydrocarbon polymers—Adrianus J. van Peski, Amsterdam, Netherlands, assignor to Shell Development Co. Filed June 20, 1936. No. 2,107,065.

Stabilization of aliphatic symmetrical iso ethers—Theodore Evans, Berkeley, Calif., assignor to Shell Development Co. Filed Aug. 17, 1936. No. 2,107,069.

Gum inhibitors for gasoline—Harold W. Elley and Herbert W. Walker, Wilmington, Del., assignors to E. I. du Pont de Nemours & Co. Filed Aug. 22, 1929. No. 2,107,147.

Top cylinder lubricant—Arthur W. Burwell, Niagara Falls, N. Y., assignor to Alox Corp., New York, N. Y. Filed Oct. 24, 1935. No. 2,107,233.

Cleveland Contracts With Socony-Vacuum

N. P. N. News Bureau

CLEVELAND—Socony-Vacuum Oil Co., Inc., won the 1938 gasoline business of the City of Cleveland with a guaranteed maximum price of 12 cents (including 4 cents state tax) for tank car delivery. The city has hired a contract hauler to truck the gasoline.

Besides the maximum price, Socony also specified that whenever the undivided dealer tank wagon price falls below 14 cents (including tax) the city will be billed at two cents off this price. Today's undivided dealer tank wagon price is 13.5 cents including tax.

This is the first time the city has obtained protection against a price advance for a whole year, C. B. Patterson, city purchasing agent, said. Heretofore, oil companies had quoted a guaranteed price for 90 days.

Standard Oil Co. (Ohio) bid the same as Socony, Patterson said, except that its maximum price was 12.5 cents.

Standard Oil Co. will supply the fire department with premium gasoline.

A year ago the city was buying gasoline by tank wagon delivery instead of tank cars and paying 14.5 cents per gallon delivered. In May, 1937, the city shifted to the tank car purchases and contracted separately for its delivery by truck and immediately effected a saving of 1.5 cents a gallon, Patterson said. The city pays one-half cent delivery charge to the contract hauler.

City purchases total 1,200,000 gallons of gasoline per year.

Shell Geologist Resigns

LOS ANGELES, March 19.—Angus McLeod, chief geologist of Shell Oil Co. since 1935 and in continuous service with that company for the past 17 years, has resigned to do private work in consulting geology and engineering in the California, Rocky Mountain and Midcontinent fields. He will continue to make Los Angeles his home.

Becomes Independent Producer

TULSA—Richard Hughes, head of the land and geological departments of Burke-Greis Oil Co., Tulsa, resigned March 1 to become an independent producer. He had been with this company for 10 years and prior to that association had served almost the same number of years as assistant chief geologist of the Mid-Continent Petroleum Corp. and its predecessor Cosden & Co. He will establish his office in Tulsa within a few weeks.

New Models Are Best Customers

(*Continued from page* 42)

miles, or about 62 per cent of the 1933 model average. Three makes of automobiles, with 117 individual cars, were in this group. All three makes were close to the average mileage for the group.

To the marketing branch of the industry these statistics are significant in showing the relative importance of automobiles of various ages to gasoline, motor oil and grease consumption. The number of automobiles of various ages, and the mileage per gallon of gasoline, varies for each service station and bulk plant. Yet if there are three automobiles, one in each age group, assumed to cover the average annual mileage shown in the Ethyl Gasoline Corp.'s figures, and gasoline is bought accordingly, the new model would represent 52.1 per cent of the sales, the middle age model, 29.5 per cent, and the older car 18.4 per cent.

New Truck Law In South Carolina Is Demanded

Part of the 2500 oil truckers, jobbers, filling station operators, farmers, lumber dealers, cotton ginners and others interested in a liberalized truck law for South Carolina who "marched on the capitol" at Columbia, S. C., March 9 demanding a new truck law from the state legislature. Recently, the U. S. Supreme Court upheld the South Carolina law limiting trucks to a maximum of 20,000 pounds weight and 90 inches width. If the present law is enforced, 75 per cent of the trucks now operating in South Carolina would be forced off the road. Supporters of a liberal truck law were hopeful, after the "march," that the limits would be raised to 40,000 pounds and 96 inches, respectively

Twenty-Five Years Ago...

distribution in the oil industry was taking its first steps. Customers were few and far between, time was a minor consideration, and equipment, including hose, was anything but efficient and dependable.

Today . . .

"gas" stations are more plentiful than drug stores; and the competitive necessity for making the greatest number of deliveries in the shortest possible time calls for modern, high-speed trucks equipped with

GOODALL

"NEWTYPE CORD"

U. S. PAT. NO. 1948410

GASOLINE TRUCK UNLOADING HOSE

This hose combines a number of important features that insure *low delivery costs* for every truck equipped with it. It has the strength to withstand constant wear and abuse, yet is exceptionally light and flexible. A specially compounded tube guards against the softening action of gasoline and prevents swelling. This, with the patented GOODALL construction of the wall, assures a full flow during the entire life of the hose. The result is more stops per day and faster delivery per stop . . . a material increase in the number of gallons distributed.

"NEWTYPE CORD" can be used for suction as well as discharge. It is made in sizes from $1\frac{1}{2}$" to $2\frac{1}{2}$" I. D. and in maximum lengths of 50 feet. Each length, when coupled, is grounded to carry off static, and tested to insure a complete circuit.

Make this test—put "NEWTYPE CORD" on one truck, now, and compare results with the balance of your fleet.

GOODALL RUBBER CO.

New York · Philadelphia · Pittsburgh · Chicago · Cleveland · Houston

GOODALL MECHANICAL CORPORATION

San Francisco · Los Angeles · Seattle

MILLS · TRENTON, N. J.

New Equipment

AND THE MANUFACTURERS

TRUCK TIP-OVER SWITCH — A switch for use on tank trucks, which cuts off ignition the instant the vehicle overturns, is manufactured by Durakool, Inc., 1027 N. Main St., Elkhart, Ind. Known as the Tip-Over Switch, it carries the approval of the Underwriters' Laboratories. It contains no fragile parts and requires no load on

the battery, according to the manufacturer.

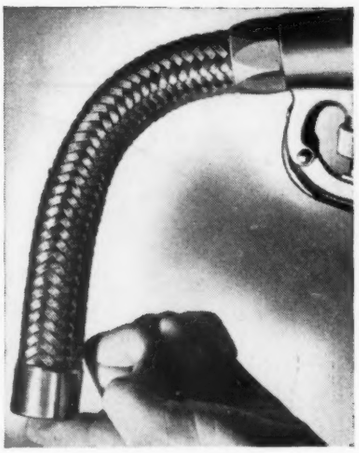
Contact is made and broken by bodies of liquid mercury inside the switch and it is said the liquid fill used on the inside effectively quenches the arc caused by breaking the circuit under load. The mercury tubes are made of metal.

FLARE—A new "flare" for trucks announced by Rich Signs Corp., 1803 E. Second St, Wichita, consists of 8-inch diameter red reflectors which are said to be visible 800 feet away. These Miro-Flares, as they are termed, have been approved by the Kansas Vehicle Commissioner for use on oil trucks of 1500 gallons capacity or less.

The circular reflectors, either single or double, are sandwiched between two covers which open like a book and provide a stand for the reflector which cannot be blown over, it is said. Closed, the "flare" is only three inches thick. Requiring attention and involving no fuel or battery expense, the reflector type flare has definite advantages over more common types, it was pointed out.

* * *

HOSE NOZZLE—Flex-Spout, a new type of flexible hose spout for gasoline hose nozzle valves is being introduced by Electric Hose & Rubber Co., Wilmington, Del. Not only can a flexible spout be inserted in curved filler pipes in less time, but it can be inserted



deeply enough that the nozzle valve can be fully opened without causing "blow-back," according to the manufacturer.

The new spout consists of a tube made of a synthetic-base (non-rubber) compound on which is woven a non-sparking braided wire cover. Standard length is 10 inches and three thread sizes are available which are said to fit practically all nozzle valves in common use.

* * *

The National Lubricating Grease Institute announces the transfer of their Executive-Secretarial offices from the D. S. Hunter & Associates, Cleveland, O., to George W. Miller, 498 Winspear Ave., Buffalo, N. Y.

DIVERSIFIED SHIPPING POINTS

are an assurance of an unfailing source of supply at all times. It also enables the supplier to offer various grades of anti-knock gasoline at competitive prices, and for "immediate" shipment.

Our refineries and various terminals listed below can furnish gasoline of undisputed quality for spot or contract movement.

Your inquiries to any of our offices will be appreciated.

JAMES B. BERRY SONS' CO., INC. OIL CITY, PA.

Branch Offices: **New York City; Chicago, Ill.; Boston, Mass.; Philadelphia, Pa.; Houston, Texas; London, England; Hamburg, Germany; The Hague, Holland.**

Refineries: **Oil City, Pa.; Emlenton, Pa.; Farmer's Valley, Pa.; St. Mary's, W. Va.**
Ocean Terminals: **Baltimore, Md.; Tiverton, R. I.; Dorchester, Mass.; Carteret, N. J.; Edgewater, N. J.; Glastonbury, Conn.; Philadelphia, Pa.**

100,000 Gallons Of Oil Used In Starting Mill

CLEVELAND, March 22.—Starting of the world's largest hot and cold strip mills required more than 100,000 gallons of lubricating oil and 50,000 pounds of grease, it was brought out at the formal opening here recently by Republic Steel Co. However, not more than a few drums per month of lubricants will be needed to keep the mills in operation, it was stated.

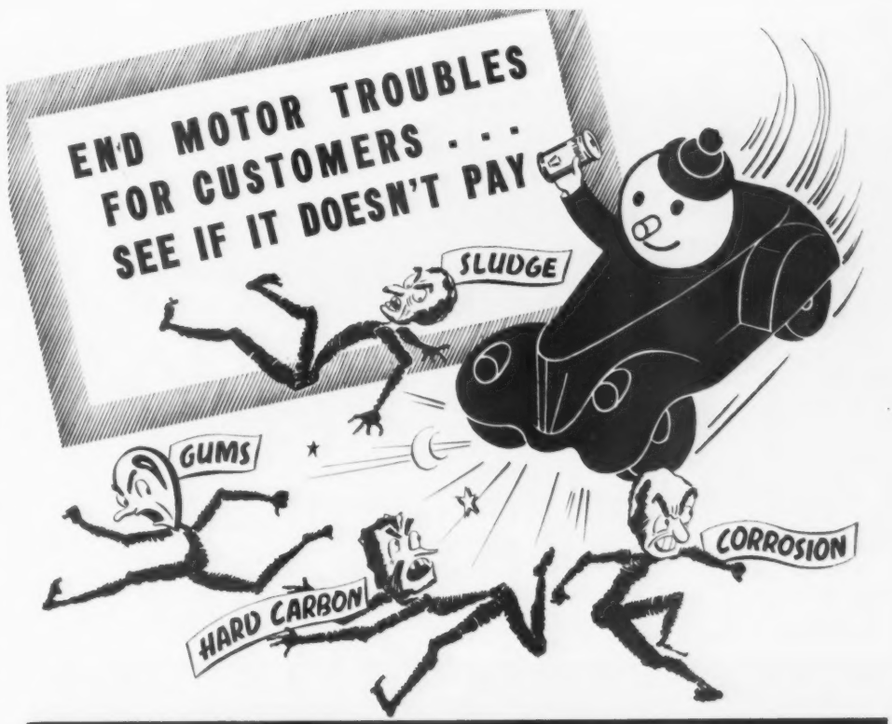
The new 98-inch mills are not only the largest but the fastest and of the most modern design, it was indicated. Witnesses to the formal opening saw 94-inch strip steel rolled from slabs which pass through the mill at speeds up to 2121 feet per minute. Rolled strips were finally wound up into coils weighing as much as 12,500 pounds almost a quarter of a mile from the starting point in as little as four minutes. These runs were accomplished by men who did not shed a drop of perspiration nor spoiled a manicure, so automatic was the mill's operation.

Three oil circulation systems are provided on the hot mill and two on the cold mill, each with a circulating capacity of 350 gallons per minute and all together maintaining 73,000 gallons of lubricating oil in circulation at all times. Extreme pressure lubricating oil is circulated in two of the hot mill systems, one for the reduction gears and one for the pinions. The back-up roll bearings are lubricated with highly refined lubricating oil. Twenty other smaller oil lubricating systems with a combined capacity of about 8000 gallons are also part of the mill's lubricating equipment.

Greasing of 4000 principal bearings is accomplished by seven greasing systems, five in the hot mill and two in the cold mill. Small portable grease pumps are used on 8000 other grease points. One grease system on the hot mill and one on the cold mill work entirely automatically. The others are operated by merely pressing a button to force grease into the entire system. Indicators and alarms insure positive lubrication at all times.

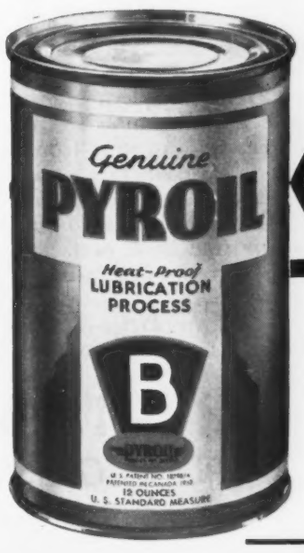
Both oil and grease systems are provided with cleaning systems to eliminate dirt and water. Grease systems are also provided with heating means to maintain proper consistency.

The largest volume of any one grade of lubricating oil, 35,000 gallons, was said to correspond to a high grade motor oil. It has a viscosity of 150 Saybolt Universal seconds at 210° F. and a viscosity index over 80. It is a highly filtered Pennsylvania cylinder stock resistant to water and with a Herschell demulsibility of 1620 at 180° F. About 40% of the lubricating oil and a similar proportion of grease has extreme pressure characteristics. The grease, which has a chlorinated sulfur base, was said to be about equivalent to hypoid gear lubricant. Both grease and oil must pass the rating of 33 pounds on the Timken testing machine.



You can't go wrong by pleasing a customer. When one drives in with valves obviously sticking, give his motor a Pyroil treatment that will bring him back smiling. When carburetors are corroded or clogged with gums, when the oil stick shows sludge and contamination—put in Pyroil. This product won't let you down. It will make customers believe in you and in your service.

You can't lose recommending a good product. And Pyroil is one—backed by years of unwavering consumer acceptance. Nationally advertised to millions. Let us give you some sound Pyroil money-making and business building facts. See phone book for our nearest Distributor. Or mail coupon. Manufactured and Guaranteed by Pyroil Company, W. V. Kidder, Founder, 611 LaFollette Ave., LaCrosse, Wisconsin, U. S. A.



Simply ADD A FEW OUNCES TO GAS TANK AND CRANKCASE

PERHAPS THERE IS A FRANCHISE OPPORTUNITY IN YOUR TERRITORY. CHECK AND MAIL COUPON FOR FACTS.

PYROIL COMPANY
611 LaFollette Ave.,
LaCrosse, Wisconsin

Please have your Distributor call, or mail further facts.
☐ Send facts concerning a possible Franchise Opportunity.

Name.....

Address.....

City..... State.....

SEND FOR THIS BOOK TODAY

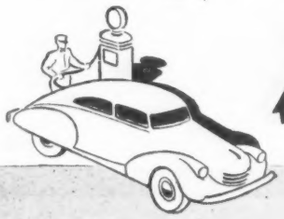
Pittsburgh Plate Glass Company 2174A Grant Bldg., Pittsburgh, Pa.
Please send me, without obligation, your book entitled "Producing Bigger Profits with Pittco Store Fronts."

Name.....

Street.....

City.....State.....

HOW MANY of the cars that pass your station every day DRIVE IN?



A PITTCO FRONT *like the one on this station in Worcester, Mass. stops the passing motorist and brings him into your station. Its clean sparkling appearance makes your selling job easier because it gives the driver confidence in you and in the products you sell.*

ARE you getting your share of the business that goes by your station every day? Or is business that could be yours going to your competitors?

A Pittco Front on your station keeps cars rolling in, instead of rolling by . . . helps you to make more sales and bigger profits. It stamps you as a progressive, up-to-the-minute dealer. Its gleaming surfaces of Carrara Structural Glass can be kept free of dirt and grime—always sparkling and inviting to the passing motorist—merely by an occasional wiping with a damp cloth. No expensive cleaning preparations are necessary.

When you remodel your station with a Pittco Front, consult an architect to assure a well-planned, economical job. Our staff of store front experts will gladly cooperate with him in planning a Pittco Front to suit your needs. Meanwhile, send the coupon for our free book of facts, figures and photographs of Pittco installations everywhere.

Be sure to see the Pittco Store Front Caravan now on a nation-wide tour. Contact our local branch for specific information as to when it will visit your territory.

PITTSBURGH TIME PAYMENT PLAN

Take up to 2 years to pay for your Pittco Front. Pay 20% down—the balance out of income.

PITTCO STORE FRONTS
glass...metal...paint

Paint • **PITTSBURGH PLATE GLASS COMPANY** • *Glass*

Markets

At A Glance . . .

MID-WESTERN: Freight increase stimulates gasoline demand.

EASTERN: New York harbor gasoline down 0.25 cent.

MID-CONTINENT: Gasoline prices up 0.125 to 0.25 cent.

GULF: Export gasoline, kerosine, gas oil offered lower.

CALIFORNIA: Wilmington oil unsettles local market.

PENNSYLVANIA: U. S. Motor continues upward; fuel oil lower.

Mid-Western

N. P. N. News Bureau

CHICAGO, March 21. — Low octane gasoline commanded virtually all trade attention in Chicago the past week. All grades, however, were quoted 0.125 cent higher in what marketers said was an increasingly firm market.

A notable scarcity of low octane gasoline was reported by the majority of local resale agents. The freight rate increase effective March 28th was cited as the chief cause of increased gasoline demand. Spring weather also was said to be an outstanding factor in the current upturn.

Michigan refiners reported active inquiry for straight run gasoline. A shortage was reported in some instances and in very few cases were inventories of any consequence reported. Higher octane gasoline was also said to be in good demand while supplies for this grade were reported in good shape.

While kerosine demand continued to improve, no appreciable upturn was reported. Majority of Chicago marketers look for pick-up in kerosine and tractor fuel demand within the next week to 10 days. Michigan refiners generally reported better demand for kerosine.

Shipments of range oil against contracts continued in fair volume, reports indicated, while spotty demand featured spot market sales. Chicago sellers lowered their quotations 0.125 cent to 4 to 4.125 cents.

Eastern

N. P. N. News Bureau

NEW YORK, March 21. — Eastern gasoline markets entered the motoring season with the load of stocks accumulated during the winter weighing heavily on wholesale prices.

Ideal motoring weather prevailed along most of the eastern seaboard during the week ended March 19. Wholesale prices continued easy. Open market sales were lacking.

While there had been reports of offerings and sales, both in tank cars and barges at 0.25 cent under published prices in the New York harbor market for the past month, prices had remained constant in the absence of confirmation of either actual open market sales, or firm offerings at lower quotations. However, lower priced offerings were confirmed last week, and both tank car and barge prices for low and high octane gasoline were reduced 0.25 cent.

Other markets along the eastern seaboard, from Baltimore north, also were rife with reports of price shading. Many buyers and sellers believed that current market conditions presage a break in open market prices. Predictions of lower prices were based on the continued decline in tanker rates from the Gulf, coupled with the easiness of gasoline at the Gulf, and the overburdened position of stocks for the country as a whole.

Mid-Continent

N. P. N. News Bureau

TULSA, March 21. — Refiners in several Mid-Continent districts reported 0.125 to 0.25-cent advances in their gasoline quotations the past week. Demand from jobbers and brokers was active, they said, in anticipation of the 10-per cent increase in freight rates scheduled for March 28. Refiners reported they were filling storage at their bulk distributing plants before the freight increase is effective.

In many instances, Mid-Continent refiners said that increased shipments the past week had left them with little gasoline available for immediate delivery. Four refiners said they were behind on shipments and others reported they were barely able to keep up with orders. Two refiners indicated they were buying gasoline in the open market to supplement their own production and said they were finding it difficult to obtain material for immediate shipment.

Inquiry for kerosine picked up considerably, according to most sellers. Jobbers were beginning to stock up to supply spring demand. Prices were steady.

South Texas lubes were offered 0.25 cent lower. Competition from other districts was reported to have upset prices. Mid-Continent lube shipments were light, although blended oils were said to be moving out in good volume.

Natural gasoline prices were reported steady; offerings from Oklahoma plants were more numerous.

N. P. N. Gasoline Index

	Dealer T.w. Cents per Gal.	Tank Car
Mar. 21	10.09	5.92
Month ago	10.13	5.87
Year ago	10.53	6.37

Dealer index is an average of "undivided" dealer prices, ex-tax, in 50 cities.

Tank car index is a weighted average of 12 wholesale markets for regular-grade gasoline.

Wax

NEW YORK, March 21. — Coastal wax markets were featureless during the second week of March.

Prices for white crude scale continued easy and were near the point where manufacture of this grade would be uneconomical, according to reports of sellers here.

One of the outstanding developments of the wax market so far this year has been the ability of prices for fully refined to hold their ground in the face of falling prices for the scale grades. While prices for fully refined grades have moved lower since the first of the year, they have not kept pace with the lower melting point scale grades.

Demand for wax continued spotty, according to all reports.

Coastal

N. P. N. News Bureau

NEW YORK, March 21. — The expropriation of foreign oil company property in Mexico by the Mexican Government, and its possible effect on petroleum markets at the U. S. Gulf, was given wide consideration by traders here late in the week ended March 19.

Announcement of the government's seizure of oil properties came too late in the week to have been reflected in the market. Traders contacted here, however, pointed out that a considerable portion of Mexican refinery output moves into export channels directly competitive with the American Gulf. Consensus was that if Mexican refineries are shut down, or run on reduced schedules, a wider market for Gulf products would be opened at a time when the American Gulf needs an expansion of its markets

REFINERY TANK CAR MARKETS

All prices on this page are publisher's opinion of open market quotations or sales, for spot shipment (10 to 15 days). Prices in cents per gallon except heavy fuel oils in dollars per barrel, tank car lots, f.o.b. refineries in districts designated, except where otherwise noted. Inter-refinery and export prices not included, unless so stated in the respective markets. Federal, state or municipal taxes not included. Prices quoted apply on products made from legally produced crude. Unless otherwise noted, gasoline octane ratings are determined by C.F.R. Motor method, A.S.T.M. D-357-33T; and lubricating oil specifications determined according to A.S.T.M. methods, unless otherwise noted.

Gasoline *and* Naphtha

Prices Effective	Mar. 21	Mar. 14
OKLAHOMA		
U. S. Motor: (Octane Test L-3)		
62 oct. & below	4.25 – 4.50	4.125– 4.25
63-66 oct.	4.50 – 4.625	4.375– 4.50
67-69 oct.	4.75 – 5.00	4.625– 4.75
70-72 oct.	5.125– 5.50	5.00 – 5.125
60-62, 400 e.p.	4.25	(a)4.125
64-66, 375 e.p.		
68-70, 350-360 e.p.		
WESTERN PENNA.		
Bradford-Warren:		
Motor gasoline:		
U. S. Motor (58-62°)	5.00 – 5.125	5.00 – 5.125
Min. 65 oct.	6.50 – 7.00	6.50 – 7.00
Other districts:		
54-56 naphtha	4.75 – 4.875	4.625– 4.75
Motor gasoline:		
U. S. Motor (58-62°)	4.875– 5.00	4.75 – 4.875
Min. 65 oct.	6.125– 6.25	6.125– 6.25

CENTRAL MICHIGAN (Prices f.o.b. Cent. Mich. refinery group basis, for shipment within Michigan. Shipments, however, may originate at plants outside Central group).

Str.-Run Gasoline	(d) 5.00 –5.50	(d) 5.00 –5.50
U. S. Motor: (Octane Test L-3)		
67-69 octane	7.75	7.75
70-72 octane	8.00 – 8.25	8.00 – 8.25

(d) Excluding Detroit shipment.

CALIFORNIA (3c tax to be added to prices if used in state)

U. S. Motor:		
54-58, for instate shipment	7.00 – 9.25	7.00 – 9.25
54-58, for outside state shipment	7.50 – 9.00	7.75 – 9.00
58-61, 375-400 e.p., 65 oct. & above	8.25 – 9.75	8.75 – 9.75

(c) N. TEX. (For shipment to Texas and N. Mex. destinations; Group 3 prices quoted on northern shipments)

U. S. Motor: (Octane Test L-3)		
62 oct. & below	(a) 4.50 –4.625	(a) 4.50 –4.875
63-66 oct.	(a) 4.875–5.25	(a) 5.00 –5.375
67-69 oct.	(a) 5.375–5.625	(a) 5.375–5.625
70-72 oct.	(a)5.625	(a) 5.625–6.00
60-62, 400 e.p.	(a)4.625	(a) 4.625–4.875

KANSAS (For Kansas destinations only)

U. S. Motor: (Octane Test L-3)		
62 oct. & below	4.50 – 4.75	4.50
70-72 oct.	5.375– 5.625	5.50

(c) W. TEX.

U. S. Motor: (Octane Test L-3)		
62 oct. & below	4.75 – 4.875	4.50 – 4.75
63-66 oct.	5.25 – 5.375	5.00 – 5.25
67-69 oct.	5.625– 5.75	5.375– 5.625
70-72 oct.	6.00 – 6.125	5.75 – 6.00

(c) E. TEX.

60-62, 400 e.p.	(a)4.50	(a)4.50

N. LA. (For shipment within La. & into Ark.)

U. S. Motor: (Octane Test L-3)		
62 oct. & below	4.125– 4.50	4.125– 4.50
63-66 oct.	4.50 – 4.75	4.50 – 4.625
67-69 oct.	4.875– 5.00	4.875– 5.00
70-72 oct.	5.375– 5.50	5.375– 5.50

ARKANSAS (For shipment within Ark. & into La.)

U. S. Motor: (Octane Test L-3)		
62 octane & below	(b)4.25	(b)4.25
67-69 oct.	(b)4.75	(b)4.75

OHIO (Quotations of S. O. Ohio. Delivered anywhere in Ohio).

U. S. Motor	7.75	7.75
Above 65 oct.	8.00	8.00

Natural Gasoline

(Prices are those to blenders on freight basis shown below. Shipments, however, may originate in other Mid-Continent manufacturing districts, such as Panhandle Texas, S. W. Texas or Kans.)

F.O.B. GROUP 3		
Grade 26-70	2.50	2.50
F.O.B. BRECKENRIDGE		
Grade 26-70	2.50	2.50
CALIFORNIA (F.o.b. plants in Los Angeles basin)		
75-85, 350-375 e.p. for blending	7.25 – 7.50	7.00 – 7.25

(a) Nominal.
(b) Only one refiner quoting.
(c) Refiners report they generally receive from 0.25c to 0.5c per gal. more for gasoline & kerosine for local or differential territory shipment.

Kerosine

Prices Effective	Mar. 21	Mar. 14
WESTERN PENNA.		
Bradford-Warren:		
45 w.w.	5.25 – 5.375	5.25 – 5.375
46 w.w.	5.375– 5.50	5.375– 5.50
47 w.w.	5.50 – 5.625	5.50 – 5.625
Other districts:		
45 w.w.	5.125– 5.25	5.125– 5.25
46 w.w.	5.25 – 5.375	5.25 – 5.375
47 w.w.	5.375– 5.50	5.375– 5.50

CENTRAL MIGHIGAN (Prices f.o.b. Cent. Mich. refinery group basis, for shipment within Michigan. Shipments, however, may originate at plants outside Central group.)

47-49 w.w.	5.25 – 5.55	5.25 – 5.55
OKLAHOMA		
41-43 w.w.	4.125– 4.25	4.125– 4.375
42-44 w.w.	4.25 – 4.50	4.25 – 4.50

KANSAS (For Kansas destinations only).

41-43 w.w.	4.375– 4.625	4.50 – 4.625
42-44 w.w.	4.625– 4.875	4.625– 4.75

(c) N. TEX. (For shipment to Texas and New Mexico destinations; Group 3 prices quoted on northern shipments).

41-43 w.w.	4.50	4.50

(c) E. TEX.

41-43 w.w.	(a) 4.125	(a)4.125

N. LA. (For shipment within La. and into Ark.)

41-43 w.w.	4.375– 4.50	4.375– 4.50

ARK. (For shipment within Ark. and into La.).

41-43 w.w.	(b)4.625	(b)4.625

CALIFORNIA

40-43 w.w.	5.50 – 7.00	5.50 – 7.00

Gas *and* Fuel Oils

Prices Effective	Mar. 21	Mar. 14
WESTERN PENNA.		
Bradford-Warren:		
36-40	4.50 – 4.75	4.625– 4.75
Other districts: (Excluding Pittsburgh District Prices).		
36-40	4.375– 4.50	4.375– 4.75

CENTRAL MICHIGAN (Prices f.o.b. Cent. Mich. refinery group basis, for shipment within Michigan. Shipments, however, may originate at plants outside Central group.)

P.W. Distillate	5.00 – 5.25	5.00 – 5.375
No. 3 gas oil, Str.	4.50 – 4.75	4.50 – 4.75
U.G.I. gas oil	4.25 – 4.50	4.25 – 4.50
Fuel Oils (Vis. at 100):		
500-700 Vis.	2.125– 2.625	2.25 – 2.75
300-500 Vis.	2.25 – 2.75	2.50 – 3.00
100-300 Vis.	2.75 – 3.25	3.25 – 3.50
OKLAHOMA		
No. 1 white	3.875– 4.00	4.00 – 4.125
No. 1 straw	(a) 3.75 –3.875	(a) 3.875–4.00
No. 2 straw	3.625– 3.75	3.75 – 3.875
No. 2 dark	(a) 3.625–3.75	(a) 3.625–3.75
U. G. I. gas oil	(a) 3.00 –3.25	(a) 3.00 –3.25
28-30 zero	3.50 – 3.625	3.625
28-30		
24-26	(b)$0.875	(b)$0.875
18-22	(a)$0.825-$0.875	(a)$0.825-$0.875
14-16	(a)$0.80-$0.825	(a)$0.80 -$0.825
KANSAS (For Kans. destinations only).		
No. 1 p.w. fuel oil	4.125– 4.375	4.25 – 4.375
10-14 fuel oil	$0.55 –$0.65	$0.60 –$0.65

N. TEX. (For shipment to Texas and N. Mex.; Group 3 prices quoted on northern shipments).

No. 1 white	(a)4.25	(a)4.25
U. G. I. gas oil	2.75 – 2.875	2.75 – 2.875
24-26	$0.775–$0.825	$0.775–$0.825
18-22	$0.75 –$0.775	$0.75 –$0.775

N. LA. (For shipment within La. and into Ark.)

No. 2	3.50 – 3.625	3.625– 3.75
20-24	$1.10 –$1.15	$1.10 –$1.15
16-20	$0.90 –$0.95	$0.95 –$1.00
10-14	$0.80 –$0.85	$0.80 –$0.85

ARK. (For shipment within Ark. and into La.).

No. 2	(b)3.75	(b)3.75
28-30 gas oil, zero	(b)3.50	(b)3.50

CALIFORNIA

San Joaquin Valley:		
Heavy fuel	$0.60 –$0.85	$0.60 –$0.85
Light fuel	$0.75 –$0.95	$0.75 –$0.95
Diesel fuel (per gal.)	3.50 – 5.00	3.50 – 5.00
Stove dist. (per gal.)	3.75 – 7.00	3.75 – 7.00
Los Angeles:		
Heavy fuel	$0.60 –$1.00	$0.60 –$1.00
Light fuel	$0.75 –$1.10	$0.75 –$1.10
Diesel fuel (per gal.)	3.00 – 5.00	3.00 – 5.00
Stove dist. (per gal.)	3.25 – 7.00	3.25 – 7.00

Gas and Fuel Oils (Cont'd)

Prices Effective	Mar. 21	Mar. 14
San Francisco:		
Heavy fuel	$1.05	$1.05
Light fuel	$1.15	$1.15
Diesel fuel (per gal.)	5.50	5.50
Stove dist. (per gal.)	7.50	7.50

Note: All above heavy fuels meet Pacific specification 400; light fuel, spec. 300; Diesel fuels, spec. 200; and stove distillate, spec. 100.

Neutral Oils

WESTERN PENNA. (Only contract shipments being made; no open spot market sales reported by refiners; following Penna. prices are refiners' quotations only.)

Viscous Neutrals No. 3 col. (Viscosity at 70° F.)		
200 Vis. (180 at 100°) 420-425 fl.		
0 p.t.	20.50 –21.00	20.50 –21.00
10 p.t.	19.50 –20.00	19.50 –20.00
15 p.t.	19.00 –19.50	19.00 –19.50
25 p.t.	17.00 –17.50	17.00 –17.50
180 Vis. (165 at 100) 410-415 fl.		
25 p.t.	16.00 –16.50	16.00 –16.50
150 Vis. (143 at 100) 400-405 fl.		
0 p.t.	17.50 –18.00	17.50 –18.00
10 p.t.	16.50 –17.00	16.50 –17.00
15 p.t.	16.00 –16.50	16.00 –16.50
25 p.t.	15.00 –15.50	15.00 –15.50

SOUTH TEXAS

Vis. Color		
Pale Oils: (*Vis. at 100° F.*)		
100 No. 1½-2½	4.75 – 5.50	5.00 – 5.50
200 No. 2-3	6.25 – 7.00	6.50 – 7.00
300 No. 2-3	6.75 – 7.50	7.00 – 7.50
500 No. 2½-3½	7.75 – 8.50	8.00 – 8.50
750 No. 3-4	8.25 – 9.00	8.50 – 9.00
1200 No. 3-4	8.75 – 9.50	9.00 – 9.50
2000 No. 4	9.00 – 9.75	9.25 – 9.75
Red Oils:		
200 No. 5-6	6.25 – 7.00	6.50 – 7.00
300 No. 5-6	6.75 – 7.50	7.00 – 7.50
500 No. 5-6	7.75 – 8.50	8.00 – 8.50
750 No. 5-6	8.25 – 9.00	8.50 – 9.00
1200 No. 5-6	8.75 – 9.50	9.00 – 9.50
2000 No. 5-6	9.00 – 9.75	9.25 – 9.75

Note: South Texas red oil prices shown above cover oils with green cast; blue cast red oils are slightly lower in some cases.

MID-CONTINENT (Vis. at 100° F.; F.o.b. Tulsa basis).

Pale Oils: (0 to 10 P.P.) Vis. Color		
60-85—No. 2	5.50	5.50
86-110—No. 2	6.00	6.00
150—No. 3	9.00	9.00
180—No. 3	10.00	10.00
200—No. 3	10.50	10.50
250—No. 3	11.50	11.50
280—No. 3	12.50	12.50
300—No. 3	13.00	13.00
Red Oils:		
180—No. 5	9.00	9.00
200—No. 5	9.50	9.50
250—No. 5	10.50	10.50
280—No. 5	11.50	11.50
300—No. 5	11.75	11.75

Note: Viscous oils, 15-25 p.p., generally are quoted 0.5c under 0-10 p.p. oils. Non-viscous oils, 15-25 p.p., generally are quoted 0.25c under 0-10 p.p. oils. Viscous oils (150-300 vis.), No. 4 color, generally are quoted 0.5c above No. 5 color oils.

CHICAGO (Vis. at 100° F.)

Pale Oils (c)0 to 10 p.p.: Vis. Color		
60-85—No. 2	7.25	7.25
86-110—No. 2	7.75	7.75
150—No. 3	10.00	10.00
180—No. 3	11.00	11.00
200—No. 3	11.50	11.50
250—No. 3	12.50	12.50
Red Oils:		
180—No. 5	10.00	10.00
200—No. 5	10.50	10.50
250—No. 5	11.50	11.50
280—No. 5	12.50	12.50
300—No. 5	12.75	12.75

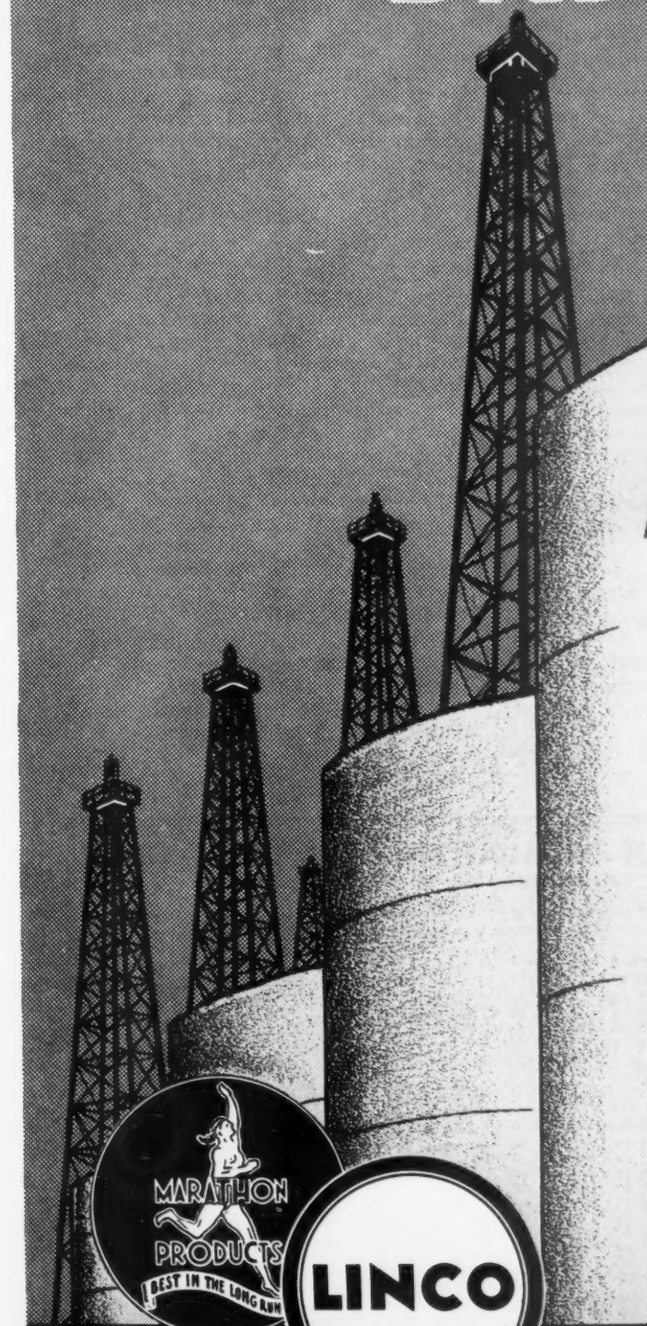
(c) Viscous oils, 15 to 30 p.p. are quoted 0.5c lower, 60-85 and 86-110 No. 2 non-viscous oils, 15 to 30 p.p., are quoted 0.25c lower. To obtain delivered prices in Chicago, add 0.25c per gal.

Cylinder Stocks

MID-CONTINENT (F.o.b. Tulsa basis).

Bright Stocks:		
190-200 Vis. at 210° D	19.00	19.00
150-160 Vis. at 210° D:		
0 to 10 p.p.	16.00	16.00
10 to 25 p.p.	15.00 –15.50	15.00 –15.50
25 to 40 p.p.	15.00	15.00
150-160 vis. at 210° E.	15.00	15.00

Well Worth Investigating



A FRANCHISE *with*

ONE OF THE LARGEST PRODUCERS OF CRUDE PETROLEUM IN THE WORLD

THE OHIO OIL COMPANY welcomes the opportunity to answer inquiries from prospective jobbers regarding an EXCLUSIVE TERRITORY FRANCHISE for our Marathon Motor Oils, Linco and Marathon Gasolines.

Linco and Marathon Gasolines are responding to an ever-increasing public demand. They deliver greater power at maximum efficiency, resulting in EXTRA MILEAGE that costs your customers nothing.

Marathon Motor Oils are refined from the cream of Ranger Crude. They have the stamina to withstand extreme tests and are noted for their endurance qualities.

Our modern refineries, located near the centers of greatest demand, insure constant and quick deliveries of Linco and Marathon products.

Write Phone or Wire

MARATHON PRODUCTS — BEST IN THE LONG RUN

LINCO

THE OHIO OIL COMPANY

GENERAL OFFICES - - - - FINDLAY, OHIO

ROBINSON, ILLINOIS — TULSA, OKLAHOMA — FT. WORTH, TEXAS

because of the increase in oil stocks due to the slow export and coastwide demand so far this year.

Trading continued extremely limited during the week ended March 19. Offerings of gasoline, kerosine and gas oil for export shipments were reported and confirmed at lower quotations during the week. Lower prices, however, did little to stimulate foreign inquiry, and while an occasional market "feeler" was encountered, no spot cargoes for trans-Atlantic shipment were reported sold.

An unconfirmed report of a sale of a cargo of high octane gasoline for domestic movement at 5.25 cents was heard late March 19. General quotations for this grade ranged from 5.375 cents up.

California

N. P. N. News Bureau

LOS ANGELES, March 19. — If this were the fishing season, many West Coast suppliers to the offshore trade would have been out with rod and reel the past week, inquiry was at such a low ebb. It was a little too wet for golf.

Observers looked askance at slightly lower bulk quotations for gasoline at the Gulf — many had anticipated improvement in these prices. In the face of this easing, the local trade had to revise estimates of value placed on cargo lots of motor fuel for spot shipment, in case actual inquiry did develop.

It was generally reported that 5.5 to 5.675 cents a gallon represented top prices which could be expected on a 375-400 e.p., 65-67 octane gasoline, and there were some who thought this range might be shaded on a firm bid. It was not believed these quotations would be made on future business, but would apply only to immediate shipments.

A flood of new oil in the Wilmington field, caused continued easing of domestic gasoline prices. Gasoline was available at some six independent plants in the Los Angeles Basin at rack prices of 7 to 7.25 cents a gallon, exclusive all tax.

Fuel and burning oils in tank car lots were inactive at quotations close to the previous week's lows.

Pennsylvania

N. P. N. News Bureau

CLEVELAND, March 21. — Aside from a fair spot demand for U. S. Motor gasoline, little activity was reported in western Pennsylvania the past week. Lubricating oils were particularly quiet and the seasonal decline in demand for kerosine and light fuel became more pronounced.

Four refiners in the lower field in position to offer U. S. Motor gasoline reported 0.125-cent advances in their

(*Continued on page* 60)

Fuel Oil . . . . .

N. P. N. News Bureau

NEW YORK, March 21. — The last week of official winter brought milder weather to the eastern seaboard, and with it came a further tapering off in domestic heating oil demand.

The stock position of light fuels at terminals of most open market suppliers was said to be comfortable. Some price shading on wholesale lots of light fuel developed the past week, but, generally speaking, prices remained fairly constant in the face of the slackening retail demand.

Industrial fuel oil demand continued slow. Prices for heavy grades, however, were relatively steady.

* * *

N. P. N. News Bureau

CHICAGO, March 21. — With spring in the air, Chicago marketers reported easing off in light burner fuel demand. Only small-lot shipments were reported in spot market sales, although instructions for shipments against contract were said to be in fair number. Prices showed little evidence of easing. Reductions would not effect increased demand, marketers said.

Michigan refiners reported slight letup in p.w. distillate demand. Prices for this product were generally reported at 5 to 5.25 cents, down 0.125 cent from last week's quotations. Contract shipments to northern sections of the state, however, were still reported good.

Continued slow demand for heavy fuels was reported by Chicago sellers. A couple of marketers said their contract shipments were holding up well, but that spot market sales were light. Michigan fuel continued to curtail sales of heavy fuel from the southwest.

Refiners in Michigan generally reported more optimistic outlook for heavy fuel. Although inventories were still said to be excessive, a few refiners stated they were gradually cutting them down. One refiner, in particular, reported being 20 cars behind on shipments of heavy fuel, although he acknowledged his was an exceptional position.

* * *

N. P. N. News Bureau

TULSA, March 21. — Mid-Continent light fuels were being pushed into the background as tractor fuels took the spotlight. Most refiners already have discontinued making light fuels suitable for heating purposes and were concentrating on tractor fuels.

With the heating oil season about over, a few Mid-Continent refiners reported having excess stocks, which they were offering at lower prices. Some refiners, however, said they had made no reductions in their prices, and would use these oils for cracking stocks rather than to shove them on the market.

Heavy fuel oil situation was rather critical, according to most Mid-Continent refiners. Stocks were increasing and demand from railroads diminishing. Buying by industrial concerns was inactive.

TANK WAGON MARKETS, HEATING OILS

Prices in Effect Mar. 21, 1938

Following are tank wagon prices of various grades of heating oil at the points shown in various territories. Prices are in cents per gallon.

	No. 1	No. 2	No. 3	No. 4
S. O. NEW JERSEY				
Newark, N. J.	*	7.00	7.00	7.00
Atlantic City, N. J.	*	6.50	6.50	6.50
Baltimore, Md.	8.00	7.00	7.00	7.00
Washington, D. C.	8.50	7.75	7.75	7.75
SOCONY-VACUUM OIL CO. INC. (S. O. New York Division)				
New York City	*	7.50	7.50	7.50
Albany, N. Y.	*	7.50	7.50	7.50
Rochester, N. Y.	*	7.50	7.50	7.50
Boston, Mass.	*	7.00	7.00	7.00
Bangor, Me.	*	8.00	8.00	8.00
Manchester, N. H.	*	7.50	7.50	7.50
Burlington, Vt.	*	8.00	8.00	8.00
Hartford, Conn.	*	7.00	7.00	7.00
New Haven, Conn.	*	7.00	7.00	7.00
Providence, R. I.	*	7.00	7.00	7.00

*Prices for No. 1 fuel in S. O. New Jersey and Socony-Vacuum territories same as for kerosine which see in tank wagon table for various cities: prices change with kerosine.

	No. 1	No. 2	No. 3	No. 4
ATLANTIC REFINING				
Philadelphia, Pa.	7.75	7.00	7.00	7.00
Allentown, Pa.	8.25	7.50	7.50	7.50
Wilmington, Del.	8.25	7.50	7.50	7.50

	No. 1	No. 2	No. 3	No. 4
ATLANTIC REFINING Cont'd				
Springfield, Mass.	9.00	7.50	....	7.50
Worcester, Mass.	9.00	7.50	....	7.50
Hartford, Conn.	9.00	7.50	....	7.50
S. O. OHIO				
Columbus Division and Cleveland	7.50	7.50	7.00	....
City of Lima	8.00	8.00	7.00	....
Rest of Ohio	8.00	8.00	7.50	....

Note: S. O. Ohio prices are for full compartment hose dumps, bucket dumps are 0.5c per gallon higher.

	No. 1 Fuel	Stanolex Furnace
S. O. INDIANA Stanolex Fuel and Furnace Oils		
Chicago	†8.8	7.00
Indianapolis	...	*11.8
Detroit		7.1
Milwaukee	8.1	7.4
Minneapolis	7.5	7.5
Sioux City	7.2	7.2
St. Louis	7.5	6.8
Kansas City	6.6	6.6

*Includes state tax of 4c.

†This price applies to 1 to 99 gals. deliveries; 150 gals. and over, 7c.

Note: Small-lot deliveries of light fuel oils range up to 2c higher than above quotations.

REFINERY TANK CAR MARKETS

All prices on this page are publisher's opinion of open market quotations or sales, for spot shipment (10 to 15 days) unless otherwise stated. Prices in cents per gallon, except heavy fuel oils in dollars per barrel, wax and petrolatums in cents per pound in barrels, tank car lots, f.o.b. refineries in districts designated, except where otherwise noted. Inter-refinery and export prices not included unless so stated in the respective markets. Federal, state or municipal taxes not included. Prices quoted apply on products made from legally produced crude. Unless otherwise noted, gasoline octane ratings are determined by C.F.R. Motor method, A.S.T.M. D-357-33T; and lubricating oil specifications determined according to A.S.T.M. methods, unless otherwise noted

Cylinder Stocks (cont'd)

Prices Effective	Mar. 21	Mar. 14
Mid-Continent (cont'd)		
120 Vis. at 210° D:		
0 to 10 p.p.	15.125-15.25	15.125-15.25
10 to 25 p.p.	14.50	14.50
25 to 40 p.p.	14.25	14.25
600 S.R. Dark Green	5.00 - 7.50	5.00 - 7.50
600 S.R. Olive Green	7.00 - 9.50	7.00 - 9.50
631 S.R.	(b)12.50	(b)12.50
Black Oil	3.50 - 4.00	3.50 - 4.00
CHICAGO (Viscosity at 210°)		
Unfiltered Steam Refined:		
140	9.00	9.00
160	10.00	10.00
200	11.00	11.00
Bright stocks, 160 vis. at 210. No. 8 color:		
0 to 10 p.p.	17.75	17.75
15 to 25 p.p.	16.75	16.75
30 to 40 p.p.	16.25	16.25
E filtered Cyl. Stock	14.50	14.50

To obtain prices delivered in Chicago, add 0.25c per gal.
(a) Nominal.
(b) Only one refiner quoting.

Prices Effective	Mar. 21	Mar. 14
WESTERN PENNA. (Only contract shipments being made; no open spot market sales reported by refiners; following Penna. prices are refiners' quotations only.)		
600 S.R. filterable	8.50 - 9.50	8.50 - 9.00
650 S.R.	10.50 -11.50	10.50 -11.50
600 fl.	11.00 -12.00	11.00 -12.00
630 fl.	14.00 -16.00	14.00 -16.00
600 Warren E	13.00 -13.50	13.00 -13.50
Bright stock, 145-155 vis. at 210°, 540-550 flash, No. 8 color:		
10 p.t.	18.50 -19.00	18.50 -19.00
15 p.t.	17.50 -18.00	17.50 -18.00
20 p.t.	16.50 -17.00	16.50 -17.00
25 p.t.	15.50 -16.00	15.50 -16.00

Petrolatums

Prices Effective	Mar. 21	Mar. 14
WESTERN PENNA. (In bbls., carloads; in tank cars, 0.5c less)		
Snow White	6.125- 6.25	6.125- 6.25
Lily White	5.125- 5.25	5.125- 5.25
Cream White	4.125- 4.25	4.125- 4.25
Light Amber	2.625- 2.75	2.625- 2.75
Amber	2.375- 2.50	2.375- 2.50
Red	2.00 - 2.25	2.00 - 2.25

Wax

Prices Effective	Mar. 21	Mar. 14
WESTERN PENNA. (In bbls., carloads, New York)		
122-124 A.m.p., w.c. scale	1.95 - 2.10	2.00 - 2.10
124-126 A.m.p., w.c. scale	1.95 - 2.10	2.00 - 2.10
OKLAHOMA (In bbls. or burlap bags, carloads)		
124-126 A.m.p., w.c. scale	(b) 2.10 -2.25	(b) 2.10 -2.25

(b) Only one refiner quoting.

CHICAGO (In bags, carload lots. Melting points are E.M.P. (A.S.T.M.) methods; add 3° F. to convert into A.m.p.)		
Fully refined:		
122-124	4.45	4.45
125-127	4.55	4.55
127-129	4.65	4.65
130-132	**5.10	**5.10
132-134	**5.35	**5.35
135-137	**6.10	**6.10

**Same prices quoted in bags or slabs loose.

MID-WESTERN TANK CAR MARKET

Prices are those made by Chicago sellers, on Group 3 (Oklahoma) freight basis, although shipments may originate in other South-western or Mid-western refining districts

Gasoline

Prices Effective	Mar. 21	Mar. 14
U. S. Motor: (Octane Test L-3)		
62 oct. and below	4.25	4.00 - 4.125
63-66 oct.	4.375- 4.625	4.25 - 4.50
67-69 oct.	4.75 - 4.875	4.625- 4.75
70-72 oct.	4.875- 5.25	4.625- 5.00

Kerosine

41-43 w.w.	4.125- 4.25	4.125- 4.25
42-44 w.w.	4.25 - 4.50	4.25 - 4.375

(b) One seller quoting.

Fuel and Gas Oils

Prices Effective	Mar. 21	Mar. 14
Domestic:		
No. 1 p.w.	3.875- 4.125	3.875- 4.125
No. 1 straw	3.75 - 4.00	3.75 - 4.00
No. 2 straw	3.75 - 3.875	3.75 - 3.875
No. 2 dark	3.50 - 3.75	3.50 - 3.75
No. 3	3.50 - 3.625	3.50 - 3.75
No. 4	$1.05 -$1.10	$1.05 -$1.10
No. 5	$0.70 -$0.80	$0.80 -$0.85
Range oil	4.00 - 4.125	4.00 - 4.25
Industrial:		
No. 4	$0.95 -$1.10	$0.95 -$1.10
No. 5	$0.65 -$0.75	$0.75 -$0.85

Prices Effective	Mar. 21	Mar. 14
Industrial (cont'd)		
No. 6	$0.45 -$0.55	$0.525-$0.60
U. G. I. gas oil	2.625- 3.00	2.625- 3.00

Naphtha and Solvent

Stoddard solvent	5.875	5.875
Cleaners' naphtha	6.375	6.375
V. M. & P. naphtha	6.375	6.375
Mineral spirits	5.375	5.375
Rubber solvent	6.375	6.375
Lacquer diluent	7.375	7.375

DAILY GASOLINE PRICES

Daily range of gasoline prices as reported in PLATT'S OILGRAM (Week Ended Mar. 18, 1938)

	March 14	March 15	March 16	March 17	March 18
U. S. Motor, (Octane Number determined according to L-3 Method in Okla., Texas and Mid-Western Districts):					
62 octane and below:					
Oklahoma	4.125- 4.25	4.125- 4.25	4.125- 4.25	4.125- 4.375	4.25 - 4.375
*North Texas	†4.50 - 4.875	†4.50 - 4.875	†4.50 - 4.875	†4.50 - 4.875	†4.50 - 4.875
West Texas	4.50 - 4.75	4.50 - 4.75	4.50 - 4.75	4.625- 4.875	4.625- 4.875
Mid-Western (Group 3 basis)	4.00 - 4.125	4.00 - 4.125	4.00 - 4.125	4.125- 4.25	4.125- 4.25
63-66 octane:					
Oklahoma	4.375- 4.50	4.375- 4.50	4.375- 4.50	4.375- 4.625	4.50 - 4.625
*North Texas	†5.00 - 5.375	†5.00 - 5.375	†5.00 - 5.375	†5.00 - 5.375	†5.00 - 5.375
West Texas	5.00 - 5.25	5.00 - 5.25	5.00 - 5.25	5.125- 5.375	5.125- 5.375
Mid-Western (Group 3 basis)	4.25 - 4.50	4.25 - 4.50	4.25 - 4.50	4.375- 4.625	4.375- 4.625
67-69 octane:					
Oklahoma	4.625- 4.75	4.625- 4.75	4.625- 4.75	4.625- 4.875	4.625- 4.875
*North Texas	†5.375- 5.625	†5.375- 5.625	†5.375- 5.625	†5.375- 5.625	†5.375- 5.625
West Texas	5.375- 5.625	5.375- 5.625	5.375- 5.625	5.50 - 5.75	5.50 - 5.75
Mid-Western (Group 3 basis)	4.625- 4.75	4.625- 4.75	4.625- 4.75	4.75 - 4.875	4.75 - 4.875
70-72 octane:					
Oklahoma	5.00 - 5.125	5.00 - 5.125	5.00 - 5.125	5.00 - 5.25	5.00 - 5.25
*North Texas	†5.625- 6.00	†5.625- 6.00	†5.625- 6.00	†5.625- 6.00	†5.625- 6.00
West Texas	5.75 - 6.00	5.75 - 6.00	5.75 - 6.00	5.875- 6.125	5.875- 6.125
Mid-Western (Group 3 basis)	4.625- 5.00	4.75 - 5.00	4.75 - 5.00	4.875- 5.125	4.875- 5.125
Motor Gasoline, 60-64 oct.					
New York harbor	†6.50	†6.50	†6.25 - 6.50	†6.25 - 6.50	†6.25 - 6.50
Philadelphia district	†6.75	†6.75	†6.75	†6.75	†6.75
Baltimore district	†6.75	†6.75	†6.75	†6.75	†6.75
Motor Gasoline, 65 oct. & above:					
New York harbor	†6.75	†6.75	†6.50 - 6.75	†6.50 - 6.75	†6.50 - 6.75
Philadelphia district	†6.75	†6.75	†6.75	†6.75	†6.75
Baltimore district	†6.75 - 7.00	†6.75 - 7.00	†6.75 - 7.00	†6.75 - 7.00	†6.75 - 7.00
U. S. Motor, 58-62°:					
Bradford-Warren (Western Penna.)	5.00 - 5.125	5.00 - 5.125	5.00 - 5.125	5.00 - 5.125	5.00 - 5.125
Other districts (Western Penna.)	4.75 - 4.875	4.75 - 4.875	†4.875- 5.00	†4.875- 5.00	4.875- 5.00
Motor Gasoline, Min. 65 oct.:					
Bradford-Warren (Western Penna.)	6.50 - 7.00	6.50 - 7.00	6.50 - 7.00	6.50 - 7.00	6.50 - 7.00
Other districts (Western Penna.)	6.125- 6.25	6.125- 6.25	6.125- 6.25	6.125- 6.25	6.125- 6.25

*For shipment to Texas and New Mexico destinations; Group 3 prices are quoted on northern shipment.
†Nominal.
‡Only one refiner quoting.

TANK WAGON MARKETS

Tank car, tank wagon, dealer, and service station prices for gasoline do not include taxes; *they do, however, include inspection fees as shown in general footnote. Gasoline taxes, shown in separate column, include 1c federal, and state taxes; also city and county taxes as indicated in footnotes. Kerosine tank wagon prices include taxes, where levied, as indicated in footnotes. Discounts to various classes of buyers also are shown in footnotes. These prices in effect Mar. 21, 1938, as posted by principal marketing companies at their headquarters offices, but subject to later correction.*

S. O. New Jersey

Esso Gasoline (*Regular Grade*)

	Consumer Tank Car	Dealer T.W.	Gasoline Taxes	Kerosine T.W.
Atlantic City, N. J.	7.25	8.75	4	8.5
Newark, N. J.	7.25	8.75	4	8.5
Annapolis, Md.	8.35	9.85	5	9.5
Baltimore, Md.	7.75	9.25	5	9
Cumberland, Md.	9.15	11.65	5	10
Washington, D. C.	8	9.5	3	9.5
Danville, Va.	8.45	10.95	6	12.9
Norfolk, Va.	7.25	9.75	6	11.5
Petersburg, Va.	7.55	10.05	6	11.7
Richmond, Va.	7.55	10.05	6	11.7
Roanoke, Va.	8.75	11.25	6	12.9
Charleston, W. Va.	8.55	11.05	6	12.6
Parkersburg, W. Va.	7.85	9.35	6	11.2
Wheeling, W. Va.	8.85	10.25	6	12.2
Charlotte, N. C.	9.15	11.65	7	12.6
Hickory, N. C.	9.65	12.15	7	13
Mt. Airy, N. C.	9.45	11.95	7	12.8
Raleigh, N. C.	8.75	11.25	7	12.1
Salisbury, N. C.	9.25	11.75	7	12.7
Charleston, S. C.	7.75	10.25	7	11.1
Columbia, S. C.	8.75	11.25	7	12.1
Spartanburg, S. C.	9.45	11.95	7	12.9

Discount to undivided dealers: Dealer t.w. price less 0.5c per gal.

Price basis to commercial consumers: To contract accounts, purchasing at least one full compartment at a time by hose connection: Effective March 12, 1937, in New Jersey, and March 8 in Maryland, District of Columbia, and in Arlington and Fairfax Counties in Virginia, on yearly purchases: from 2,500 to 100,000 gals., consumer t.w. price at time and place of delivery; 100,000 gals. per year consumer tank car price, plus 0.5c per gal. Generally consumer t.w. price in foregoing states is equivalent of dealer t.w. price, less 0.5c per gal.

Effective May 15, 1937, on Esso and Esso (by tank wagon) in North and South Carolina, West Virginia and Virginia (except Arlington and Fairfax Counties, which see above), commercial consumers taking deliveries of 50 gals. (West Va. 100 gals.) or more at one time will be billed at the posted consumer t.w. price. Deliveries less than 50 gals. (West Va. 100 gals.) will be billed at 4c per gal. over posted consumer t.w. price. Generally, posted consumer t.w. price will be equivalent to the dealer price less 0.5c per gal.

Kerosine Discount: 1c off t.w. price for 25 gals., or more, under contract thru territory (Baltimore City contract not necessary) except no discount in state of New Jersey.

Socony-Vacuum Oil Co., Inc.

(*S. O. New York Division*)

	Socony Mobilgas (*Regular Grade*) Consumer Tank Car	"Split" Dealer T.W.	Gasoline Taxes	Kerosine T.W.
Metropolitan N. Y. City: Boroughs of Manhattan, Bronx and Brooklyn (Kings and Queens)	7.5	9.5	*5	8.75
Borough of Richmond (Staten Is.)	7.5	9.5	*5	8.75
Albany, N. Y.	7.5	9.5	5	9
Binghamton, N. Y.	8.7	10.3	5	9
Buffalo, N. Y.	8.54	9.5	5	7.5
Jamestown, N. Y.	7.78	10.8	5	8.35
Plattsburg, N. Y.	7.9	10.4	5	9.5
Rochester, N. Y.	8.17	10	5	8.5
Syracuse, N. Y.	8.12	9.5	5	9
Danbury, Conn.	7.8	9.8	4	9
Hartford, Conn.	7.6	9.6	4	8.5
New Haven, Conn.	7.5	9.5	4	8
Bangor, Me.	8.2	9.8	5	9.5
Portland, Me.	7.7	9.5	5	8.75
Boston, Mass.	7.5	9	4	8.5
Concord, N. H.	8.2	10.5	5	9.5
Lancaster, N. H.	9.1	11.5	5	10.25
Manchester, N. H.	8	10	5	9
Providence, R. I.	7.5	9.3	4	8.5
Burlington, Vt.	7.9	9.9	5	9.5
Rutland, Vt.	8.2	10.2	5	9

*Plus 2% city sales tax computed at time of each sale.

Discount to undivided dealers: 0.5c less than "split" dealer t.w.

Price basis to commercial consumers: Effective about Nov. 15, 1936 in New York and New England for tank wagon delivery: monthly purchases of 25,000 gals. or over, pay consumer tank car price at point of delivery, plus 0.5c gal.; monthly purchases of 5,000 to 25,000 gals., pay undivided dealer tank wagon price at point of delivery; monthly purchases of less than 5,000 gals., pay divided dealer tank wagon price at point of delivery. Private consumers pay undivided dealer tank wagon price at point of delivery, plus 2c gal.

Atlantic Refining

	Atlantic White Flash Gasoline (*Regular Grade*) Commercial Tank Car	Dealer T.W.	S.S.	Gasoline Taxes	Kerosine T.W.
Philadelphia, Pa.	7.25	8.75	12	5	10.5
Pittsburgh	8	10	15	5	11
Allentown	7.75	9.25	**	5	11
Erie	8	9.5	**	5	10
Scranton	8	9.5	**	5	11
Altoona	8	10	**	5	11
Harrisburg	7.5	9	**	5	11
Williamsport	8	10	**	5	11
Dover, Del.	...	9	**	5	11
Wilmington	...	9	**	5	11
Boston, Mass.	...	9	**	4	8.5
Springfield, Mass.	...	9.5	**	4	8.5
Worcester, Mass.	...	10.3	**	4	9
Fall River, Mass.	...	8.5	**	4	8.5
Hartford, Conn.	...	9.6	**	4	8
New Haven, Conn.	...	9.5	**	4	8
Providence, R. I.	...	9.3	**	4	8.5
Atlantic City, N. J.	...	8.75	**	4	8.5
Camden, N. J.	...	8.75	**	4	8.5
Trenton, N. J.	...	8.75	**	4	8.5
Annapolis, Md.	...	9.85	**	5	9.5
Baltimore, Md.	...	9.25	**	5	9
Hagerstown, Md.	...	10.35	**	5	10
Richmond, Va.	...	10.05	**	6	11.7
Wilmington, N. C.	...	10.35	**	7	11.3
Brunswick, Ga.	...	10	**	7	*13
Jacksonville, Fla.	...	9.5	**	8	10

*Georgia has kerosine tax of 1c per gal., not included in above price.

**Atlantic Refining transferred stations to dealers; no prices available.

Discount to undivided dealers: Dealer t.w. less 0.5c per gal.

Price basis to commercial consumers: in Penna. and Delaware, effective Mar. 11, 1937, on yearly gasoline purchases to contract accounts taking full compartment hose deliveries, using 100,000 gals. or more per year, tank car price plus 0.5c per gal.; consumers taking less than 100,000 gals., undivided dealer price. Consumers under contract and not under contract, taking less than full compartment delivery, and consumers not under contract taking full compartment delivery, get divided dealer price. Consumers taking less than 25 gals., t.w. delivery, get 4c above undivided dealer price.

Discount on kerosine: Effective Oct. 29, 1936, in Pennsylvania and Delaware, 2c per gal. off t.w. price on t.w. deliveries of 25 gals. or more at one time.

S. O. Ohio

	Sohio X-70 Gasoline (*Regular Grade*) Consumer T.W.	†Divided Dlr.	Gasoline Taxes	Kerosine T.W.
Ohio State-wide	11	10	5	*13
Counties where prices are below statewide:				
Columbiana, Defiance and Pickaway	10.5	9.5	5	....
Franklin, Knox and Paulding	10	9	5	....
	Renown Gasoline (*Third Grade*)			
Ohio State-wide	10.5	9.5	5	....
Counties where prices are below statewide:				
Columbiana, Defiance and Pickaway	10	9	5	....
Franklin, Knox and Paulding	9.5	8.5	5	....
Counties where prices are above statewide:				
Butler, Clermont, Darke, Greene, Hamilton, Miami, Montgomery, Preble and Warren	11	10	5	....

S. O. Ohio Cont'd

Kerosine Prices

(*Off Statewide Level*)

Kerosine prices are off statewide level in the following counties:

Allen, Auglaize, Champaign, Columbiana, Darke, Geauga, Greene, Hardin, Logan, Mahoning, Mercer, Preble, Putnam, Shelby, Trumbull, Union, Van Wert and Wyandot:	*12.5
Paulding	*12
Ashtabula	*11.5
Fayette, Licking, Madison, Pickaway, Portage and Summit	*9.5

†This price also to authorized agents, exclusive of 0.5c rental. Discount to undivided dealers: 0.5c less than divided dealer t.w.

*Kerosine prices include 1c state tax.

Commercial Tank Wagon Q.D.A. to contract accounts: Effective Oct. 20, 1937, thru Ohio (except in 30 counties), on monthly purchases, off posted consumer t.w. price: 0 to 999 gals., 0.5c; 1,000 to 19,999 gals., 1.5c; 20,000 gals. and over, 2.5c. The 30 counties where Q.D.A. differs from statewide are: Allen, Ashtabula, Auglaize, Butler, Champaign, Darke, Defiance, Erie, Fulton, Geauga, Hamilton, Hardin, Henry, Logan, Lorain, Lucas, Mahoning, Mercer, Ottawa, Paulding, Putnam, Sandusky, Scioto, Shelby, Trumbull, Union, Van Wert, Washington, Williams and Wood.

Sales tax: Ohio's 3% sales tax, effective Jan. 27, 1935, is added "where assessable, to regular posted prices," S. O. Ohio says.

On kerosine, prices to resellers and commercial consumers are posted generally at 3c per gal. below consumer t.w. price in any quantity, when such prices are on statewide level.

S. O. Kentucky

	Crown Gasoline (*Regular Grade*) Consumer T.W.	Net Dlr.	Gasoline Taxes	Kerosine T.W.
Covington, Ky.	12.5	10.5	6	11
Lexington, Ky.	13.5	10.5	6	11
Louisville, Ky.	13	10	6	10.5
Paducah, Ky.	11	8	6	10
Jackson, Miss.	12.5	9.5	7	*13
Vicksburg, Miss.	12.5	9.5	7	*13
Birmingham, Ala.	13	10	*8	12
Mobile, Ala.	12	9	*9	11
Montgomery, Ala.	13	10	*9	*13
Atlanta, Ga.	14	11	7	*14
Augusta, Ga.	14	11	7	*14
Macon, Ga.	14	11	7	*14.5
Savannah, Ga.	12.5	9.5	7	*12
Jacksonville, Fla.	12.5	9.5	8	11
Miami, Fla.	12.5	9.5	8	12.5
Pensacola, Fla.	13	10	*9	12
Tampa, Fla.	12.5	9.5	8	10.5
	Kyso Gasoline (*Third Grade*)			
Covington, Ky.	10.5	8	6	....
Lexington, Ky.	11.5	9	6	....
Louisville, Ky.	11	8.5	6	....
Paducah, Ky.	9	6.5	6	....
Jackson, Miss.	11	8.5	7	....
Vicksburg, Miss.	11	8.5	7	....
Birmingham, Ala.	11	8.5	*8	....
Mobile, Ala.	9.5	7	*9	....
Montgomery, Ala.	10.5	8	*9	....
Atlanta, Ga.	12	9.5	7	....
Augusta, Ga.	12	9.5	7	....
Macon, Ga.	12	9.5	7	....
Savannah, Ga.	10.5	8	7	....
Pensacola, Fla.	11	8.5	*9	....

Discounts to all tank wagon consumers: Effective Jan. 4, 1937, thru territory, on Crown gasoline, 3c per gal. below consumer t.w. price; on Kyso, 2.5c below, regardless of quantity purchased, per month.

Discounts on kerosine: Prices in Kentucky are net, but in other states subject to 2c discount.

**Taxes*: In the tax column is included these city and county gasoline taxes at the following points: Mobile, 2c city; Birmingham, 1c city; Montgomery, 1c city and 1c county; Pensacola, 1c city. Georgia and Mississippi kerosine prices include 1c state tax. Montgomery kerosine price includes 1c city tax.

Above prices include these inspection fees on both gasoline and kerosine, per gallon, figured on basis of 50 gallons per barrel:

Alabama, 1/40c on gasoline, 1/2c on kerosine; Arkansas, 1/5c per gal. in a single barrel. 1/20c per gal. in bulk; Florida, 1/8c; Illinois, 3/100c; Indiana, 1/5c per gal. in lots up to 25 bbls.; 2/25c per gal. in lots of 25 bbls. or more; Kansas, 1/50c, (3/50c can be charged to meet inspection department expenses); Louisiana, 1/32c; Minnesota, 1/25c; Missouri, 3/100c; Nebraska, 3/100c; Nevada, gasoline, 1/20c; North Carolina, 1/4c; North Dakota, 1/20c; Oklahoma, 2/25c per gal. in lots of more than 50 bbls., 1/5c in lots less than 50 bbls.; South Carolina, 1/8c; South Dakota, 1/10c; Tennessee, 2/5c; and Wisconsin, 1/25c.

Kerosine inspection fee only: Iowa, 3/50c; Michigan, 1/5c per gal.

TANK WAGON MARKETS

Tank car, tank wagon, dealer, and service station prices for gasoline do not include taxes; *they do, however, include inspection fees as shown in general footnote. Gasoline taxes, shown in separate column, include* 1c *federal, and state taxes; also city and county taxes as indicated in footnotes. Kerosine tank wagon prices include taxes, where levied, as indicated in footnotes. Discounts to various classes of buyers also are shown in footnotes. These prices in effect Mar.* 21, 1938, *as posted by principal marketing companies at their headquarters offices, but subject to later correction.*

S. O. Indiana

Red Crown (*Regular Grade*)
Stanolind (*Third Grade*)

	Red Crown Cons. T.W.	Red Crown Dealer	Stanolind Dealer	Gasoline Taxes	Kerosine T.W.
Chicago, Ill.	11.3	9.3	8.1	4	10.2
Decatur, Ill.	11.3	9.8	7.7	4	10.2
Joliet, Ill.	11.3	9.8	8.1	4	10.2
Peoria, Ill.	11.3	9.8	9.3	4	10.2
Quincy, Ill.	11.1	9.6	8.5	4	10
Indianapolis, Ind.	11.9	10.4	9.2	5	*14.8
Evansville, Ind.	11.8	10.3	6.8	5	*14.7
South Bend, Ind.	12.2	10.7	9.2	5	*13
Detroit, Mich.	11.1	9.6	9.1	4	9.8
Grand Rapids, Mich	12.3	9.1	9.1	4	11
Saginaw, Mich.	12.1	10.6	10.1	4	9.1
Green Bay, Wis.	12	10.5	9.8	5	9.9
Milwaukee, Wis.	11.5	10	9.2	5	10.4
La Crosse, Wis.	11.7	10.2	9.7	5	10.6
Minneapolis-St. Paul	11.7	10.2	9.7	5	10.6
Duluth, Minn.	12	10.5	10	5	10.9
Mankato, Minn.	11.7	10.2	9.7	5	10.6
Des Moines, Ia.	11.1	9.6	7	4	*11
Sioux City, Ia.	11.3	9.8	9.3	4	*13.2
Davenport, Ia.	11.3	9.8	9.3	4	*13.2
Mason City, Ia.	11.4	9.9	9.4	4	*13.3
St. Louis, Mo.	10.9	9.4	7.2	*4	9.8
Kansas City, Mo.	10.6	9.1	8.6	*4	9.5
St. Joseph, Mo.	10.6	9.1	8.6	*4	9.5
Fargo, N. D.	12.7	11.2	10.7	4	11.6
Minot, N. D.	13.9	12.4	11.9	4	12.8
Huron, S. D.	12.1	10.6	10.1	5	11
Wichita, Kans.	10.1	8.4	6	4	7

*Taxes: in the tax column is included these city and state gasoline taxes at following points: Kansas City, St. Joseph and St. Louis, 1c city tax. State Kerosine taxes: Indiana, 4c; Iowa, 3c, all included in above prices.

Discount to commercial consumers: Effective Jan. 1, 1935, thru territory, except Michigan effective Feb. 1, on purchases per month, discount off t.w. prices; all gasolines, 25 to 1,000 gals., at t.w. price; 1,000 gals., or more, 1.5c off t.w. on Ethyl and Red Crown, and 1c on Stanolind (latter effective June 9, 1937). Minimum delivery is 25 gals.

S. O. Nebraska

Standard Red Crown Gasoline (*Regular Grade*)

	T.W.	Dealer	Gasoline Taxes	Kerosine T.W.
Omaha, Neb.	11.7	10.2	6	10.5
McCook	11.5	9	6	10
Norfolk	12.1	10.6	6	10
North Platte	12.5	8.9	6	11.3
Scottabluff	13.2	10	6	12

Discounts to commercial consumers: for tank wagon deliveries covered only by Standard Commercial Consumer Contract, effective January 1, 1935.

S. O. Louisiana

Esso Ene (*Regular Grade*)

	Consumer Tank Car	Dealer T.W.	Gasoline Taxes	Kerosine T.W.
Little Rock, Ark.	7.25	9.75	7.5	11.5
Alexandria, La.	7	9.5	8	*10.5
Baton Rouge, La.	6.5	9	8	*12
New Orleans, La.	6.5	9	*10	*12
Lake Charles, La.	7.5	10	8	*12.5
Shreveport, La.	6	8.5	8	*9.5
Lafayette, La.	7.5	10	8	*12.5
Bristol, Tenn.	9.75	11	8	14.5
Chattanooga, Tenn.	9	11.5	8	13.5
Knoxville, Tenn.	9.5	12	8	14
Memphis, Tenn.	7.5	10	8	12
Nashville, Tenn.	8.5	11	8	10.5

*New Orleans gasoline tax includes 7c state, 1c federal, and 2c parish tax. Louisiana kerosine prices include 1c state tax; in addition New Orleans has 1c parish tax.

Price basis to dealers: Undivided dealers get dealer price, less 0.5c.

Price basis to commercial consumers: Effective May 15, 1937, thru territory; commercial consumers taking 50 gals. or more at one time will be billed at posted consumer t.w. price; those taking less than 50 gals. at one time will be billed at 4c per gal. over posted consumer t.w. price. Generally, the posted consumer t.w. price will be equivalent to the dealer price less 0.5c per gal.

Humble Oil & Refining Co.

Humble Motor Fuel (*Regular Grade*)

	*T.W.	S.S.	Gasoline Taxes	Kerosine T.W.
Dallas, Tex.	9	13	5	8
Ft. Worth, Tex.	9	13	5	8
Houston, Tex.	9.5	13.5	5	8
San Antonio, Tex.	8.5	12.5	5	8

U. S. Motor Gasoline (*Third Grade*)

Dallas, Tex.	7	10	5
Ft. Worth, Tex.	7.5	10	5
Houston, Tex.	8.5	11.5	5
San Antonio, Tex.	7.5	10.5	5

*Price is t.w. price to all classes of dealers and consumers.

Price basis to "open" dealers: discount off posted retail price: when posted retail price, including all taxes on Esso motor fuel is: 19.1c per gal. and above, discount is 3.5c; 19c to 18.1c, 3c, and 18c and below, 2.5c. Humble motor fuel, 17.1c and above, 3.5c; 17 to 16.1c, 3c; and 16c and below, 2.5c; U. S. motor fuel, 15.1c and above, 2.5c; 15 to 14.1c, 2c; and 14c and below, 1.5c.

Continental Oil

Conoco Bronze (*Regular Grade*)
Demand (*Third Grade*)

	Dealer Prices— Conoco Bronze	Demand	Gasoline Taxes	Kerosine T.W.
Denver, Colo.	9	8	5	11.5
Grand Junc., Colo.	14	13	5	15
Pueblo, Colo.	8	7	5	10.5
Casper, Wyo.	12	11	5	11.5
Cheyenne, Wyo.	11	7	5	13
Billings, Mont.	13.5	12	6	15.5
Butte, Mont.	13.5	10.5	6	15.5
Great Falls, Mont.	13.5	12.5	6	15.5
Helena, Mont.	13.5	12.5	6	15.5
Salt Lake City, Utah	14.5	11.5	5	16
Boise, Ida.	15.5	13.5	6	18
Twin Falls, Ida.	15	14	6	18
Albuquerque, N. M.	11	10	†6.5	12
Roswell, N. M.	11	8.5	†6.5	10.5
Santa Fe, N. M.	12	9.5	*7	12
Muskogee, Okla.	9.5	8	5	7
Oklahoma City, Okla.	9	6	5	8
Tulsa, Okla.	9	6	5	6
Ft. Smith, Ark.	9.25	8.5	5	8
Little Rock, Ark.	9.75	7.625	7.5	9.5
Texarkana, Ark.	9	6	5	8.5

†Includes city tax of 0.5c.
*Includes 1c city tax.

S. O. California

Standard Gasoline (*Regular Grade*)

	T.W.	S.S.	Gasoline Taxes	Kerosine T.W.
San Francisco, Cal.	13.5	14.5	4	11.5
Los Angeles, Cal.	13	14	4	10
Fresno, Cal.	14.5	15.5	4	12.5
Phoenix, Ariz.	15	16	6	†17
Reno, Nev.	15	16	5	13
Portland, Ore.	14	15	6	13.5
Seattle, Wash.	14	15	6	13.5
Spokane, Wash.	16.5	17.5	6	16
Tacoma, Wash.	14	15	6	13.5

Flight Gasoline (*Third Grade*)

San Francisco, Cal.	12	13	4	....
Los Angeles, Cal.	11.5	12.5	4	....
Fresno, Cal.	13	14	4	....
Reno, Nev.	13.5	14.5	5	....
Phoenix, Ariz.	13.5	14.5	6	....
Portland, Ore.	12.5	13.5	6	....
Seattle, Wash.	12.5	13.5	6	....
Spokane, Wash.	15	16	6	....
Tacoma, Wash.	12.5	13.5	6	....

†Includes 5c state tax.

Discount to dealers: on gasoline, off t.w. price on Standard Ethyl and Standard Gasoline, to 100% dealers, 3c; to split dealers, 2c; on Flight gasoline, both 100% and split dealers, 2c.

On Stanavo Aviation Gasoline, to all classes of dealers, 3c off t.w.

To commercial consumers: off tank wagon price: on single deliveries of 40 gallons and over. Stanavo Aviation, Standard Ethyl and Standard Gasolines, 3c. Flight Gasoline, 2c per gallon. Tank wagon delivery, less than 40 gals., 1c per gal. above posted t.w. price. On kerosine 3c off t.w. price; plant deliveries to jobbers, 2.5c below t.w.

Canada

PRICES OF IMPERIAL OIL LTD.

Per Imperial Gallon, which is 1.2 U. S. Gallons

3-Star Imperial Gasoline (*Regular Grade*)

	T.W.	Gasoline Taxes	Kerosine T.W.
Hamilton, Ont.	16	6	17
Toronto, Ont.	16	6	17
Brandon, Man.	21.1	7	22.3
Winnipeg, Man.	20.5	7	20.7
Regina, Sask.	20	7	22
Saskatoon, Sask.	22.8	7	24.8
Edmonton, Alta.	19.5	7	21.5
Calgary, Alta.	17	7	19
Vancouver, B. C.	16	7	23
Montreal, Que.	15	6	17.5
St. John, N. B.	16	8	18.5
Halifax, N. S.	16	8	18.5

Discounts to undivided dealers, 1c off t.w. price, except Maritime Provinces where undivided dealers pay t.w. price. Divided dealers pay t.w. price, thru territory.

Aviation Gasoline

Following are tank car and/or tank wagon prices, as indicated, of aviation gasoline in principal marketing territories (Stanavo Aviation Gasoline in all territories except where otherwise noted).

S. O. NEW JERSEY

	*Ethyl T.C.	Tank Car	T.W.
Bayonne, N. J.	19.5	9.5	12.5
Baltimore, Md.	....	10	13
Washington, D. C.	....	....	13.5
Richmond, Va.	....	....	14.7
Greensboro, N. C.	....	....	15.7
Raleigh, N. C.	....	....	17.6
Charleston, W. Va.	....	....	12.2

*This is Stanavo Ethyl Aviation Gasoline, 100 octane number, tank car price.

COLONIAL BEACON OIL CO.

	T.W.
Brooklyn, N. Y.	12.8
Buffalo, N. Y.	14.5
Boston, Mass.	15

S. O. PENNSYLVANIA

Philadelphia, Pa.	13.6
Pittsburgh, Pa.	14.4

S. O. LOUISIANA

New Orleans, La.	13.3
Shreveport, La.	13.6

Prices in above four territories are on a 74 octane grade aviation gasoline except where otherwise noted. An 80 octane product generally brings 0.5c premium and an 87 octane product, 1.5c premium over the 74 octane grade.

Note: S.s. prices in above four territories are generally 6c over t.w. prices. Above t.w. prices are net, with no discounts allowed for quantity purchases. T.w. prices are generally tank car price, plus freight, plus 2.5c per gal.

S. O. OHIO
Thru Ohio
Stanavo Ethyl Aviation

	Consumer T.W.	Gasoline Taxes
73 octane	15.5	5
80 octane	16.5	5
87 octane	17.5	5

Discounts: For delivery on contract to hangar operators and resellers: 2c below consumer posted t.w. price, shown above.

S. O. INDIANA
Stanavo Ethyl Aviation Gasoline, 73 Octane Number

Chicago, Ill.	14.6	4
Detroit, Mich.	16.1	4
Milwaukee, Wis.	14.8	5
Minneapolis, Minn.	15	5
St. Louis, Mo.	14.2	3
Kansas City, Mo.	13.9	*4
Fargo, N. D.	16	4
Huron, S. D.	15.4	5

*Includes 1c city tax.

HUMBLE OIL & REFINING CO.

	Tank Car
Baytown, Tex.	8.5

CONTINENTAL OIL CO.
Conoco Special Gasoline

	Dealer	Gasoline Taxes
Denver, Colo.	14.5	5
Cheyenne, Wyo.	15	5
Helena, Mont.	16.5	6
Salt Lake City, Utah	17.5	5
Albuquerque, N. M.	14	*6.5

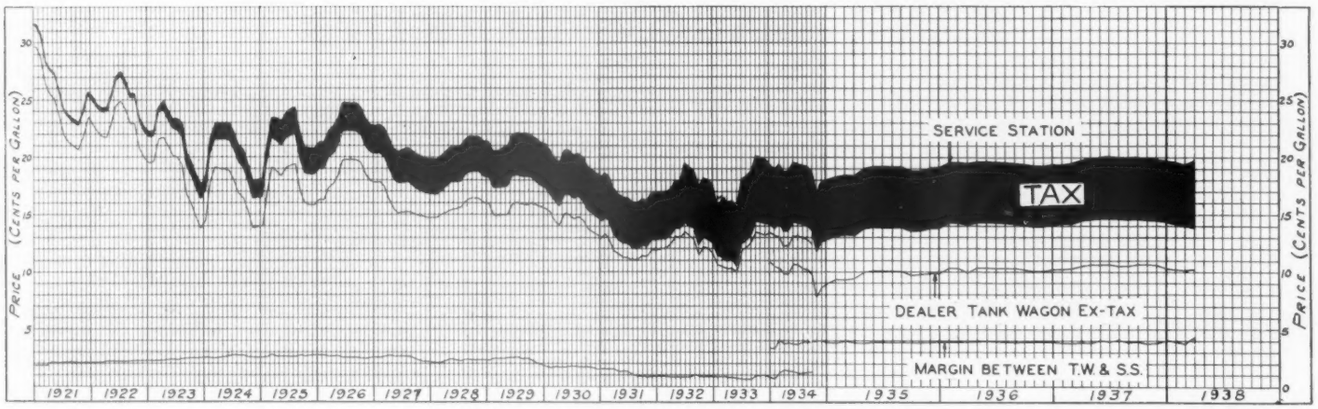
*Includes city tax of 0.5c.

S. O. CALIFORNIA

	T.W.	
Phoenix, Ariz.	17	6
Los Angeles, Cal.	15	4
San Francisco, Cal.	15.5	4
Reno, Nev.	17	5
Portland, Ore.	16	6
Seattle, Wash.	16	6
Spokane, Wash.	18.5	6

Note: For discounts, etc., see note under Standard and Flight gasoline above.

Trend of Gasoline Prices and Gasoline Taxes, at 50 Representative Cities



TANK WAGON MARKETS

Tank car, tank wagon, dealer, and service station prices for gasoline **do not include taxes;** *they do, however, include inspection fees as shown in general footnote. Gasoline taxes, shown in separate column, include 1c federal, and state taxes; also city and county taxes as indicated in footnotes. Kerosine tank wagon prices include taxes, where levied, as indicated in footnotes. Discounts to various classes of buyers also are shown in footnotes These prices in effect Mar. 21, 1938, as posted by principal marketing companies at their headquarters offices, but subject to later correction.*

Naphtha (In Tank Wagon)

S. O. NEW JERSEY

Posted Tank Wagon Prices

	Mineral Spirits	V.M.&P.
Newark, N. J.	11.5	15.5
Baltimore, Md.	15.5	....
Washington, D. C.	15	....

Discounts: Buyers taking following quantities, at one time, get these discounts: Newark, 2c per gal. on 200 gals. or more; less than 200 gals., 0.5c higher price. Baltimore 2c off on 25 to 100 gals. and 3c on over 100 gals. Washington, 2c off to contract buyers.

SOCONY-VACUUM OIL CO.

Buffalo, N. Y.	13	14
New York City	9.5	11.5
Rochester, N. Y.	13	15
Syracuse, N. Y.	14	15
Boston, Mass.	13.5	14
Bridgeport, Conn.	12.5	14
Hartford, Conn.	12	13.5
Providence, R. I.	13.5	14.5

ATLANTIC REFINING CO.

Philadelphia, Pa.	11.5	12.5
Lancaster, Pa.	13	14
Pittsburgh, Pa.	12.5	14.5

Note: Prices for Mineral Spirits also apply to Stoddard Solvent; and prices for V.M.&P. Naphtha apply also to Light Cleaners Naphtha.

S. O. OHIO

	S.R. Solvent	V.M.&P. Naphtha
Thru Ohio	12.5	13.5

Note: V.M.&P. Naphtha prices also apply on Dry Cleaners naphtha and special Varnolene; Varnolene and Sohio Solvent 0.5c below these prices. Discounts to contract consumers, off t.w. price: 300 to 999 gals., 0.5c; 1,000 to 2,499 gals., 0.75c; 2,500 to 4,999 gals., 1c; 5,000 or more gals., 1.5c.

S. O. INDIANA

(Prices include state and federal taxes)

	Oleum Spirits	V.M.&P. Naphtha	Stanisol
Chicago, Ill.	15.9	16.2	15.6
Detroit, Mich.	19.3	18.3	19.4
Kansas City, Mo.	14.4	15.4	14.4
St. Louis, Mo.	14.7	15.7	14.6
Milwaukee, Wis.	19.3	20.3	19.3
Minneapolis, Minn.	19.5	20.5	18.1

Note: Prices for V. M. & P. apply also to Light Cleaners Naphtha. All prices, with exception of Missouri points, include state tax. Prices shown are base prices, before discounts.

Naphtha (In Tank Cars)

In Tank Cars (F. o. b. refinery or seaboard terminal except Ohio, delivered price.)

	V.M.&P. Naphtha	Solvent
Baltimore	10.5	9.5
New York Harbor	10	9
Philadelphia district	10.5	9
Boston	10.5	9.5
Providence	10.5	9.5
Ohio points, delivered	8.875	*8

*This is on rubber solvent.

Note: In Ohio, prices on D.C. naphtha and special Varnolene are same as V.M.&P.; on Varnolene and Sohio Solvent, prices are 0.5c less than on V.M.&P.

Latest Changes

From Mar. 15 to Mar. 21 inclusive. Dates and amounts of changes shown. See table for full current prices.

S. O. Ohio—Q.D.A.:
Commercial consumer Q.D.A., thru Cuyahoga county, revised, March 22, to: 0 to 99 gals., 0.5c per gal. below posted consumer t. w.; 100 to 9999 gals., 1.5c; 10,000 gals. or over, 2.5c.

S. O. Kentucky—Crown Gasoline:
Up 2c, Mobile, March 15.

Kyso:
Up 1.5c, Mobile, March 15.

S. O. Indiana—Red Crown:
Dealer up 1.4c, Wichita, March 15.

S. O. Louisiana—Kerosine:
Cut 1c, Nashville, March 17.

Corrections

Notation of amount of change and dates not previously shown in table. Table in this issue is corrected to show these changes.

S. O. New Jersey—Fuel Oil:
Newark, Nos. 2, 3 and 4 should have been 7c instead of 6.5c as carried since March 2nd issue.

S. O. Kentucky—Crown Gasoline:
Cut 2c, Paducah, March 11.

Kyso:
Established at Paducah, at 9c consumer t. w., and 6.5c net dealer, ex taxes, March 11.

S. O. Indiana—Red Crown:
Dealer up 0.7c, Decatur, March 14.

S. O. Nebraska—Red Crown:
North Platte, dealer price cut 2.1c, Mar. 11.

Pennsylvania

(*Continued from page* 56)

quotations and, late in the week, said that small-lot sales had been made at 4.875 cents and 5 cents. At this point, prices were up 0.375 cent from this winter's low reached late in January.

All grades of kerosine and fuel oil were quoted 0.125 cent lower throughout the field. At 5.125 to 5.25 cents for 45 w.w. kerosine and 4.375 to 4.5 cents for 36-40 fuel oil, lower field refiners said demand was slow. At the same time one refiner reported being short of kerosine and said that he had bought about 12 cars to meet his commitments to regular customers.

The lull in lubricating oil buying was described by some refiners as the most severe that they had ever experienced. Exporters showed no interest in the market and inter-refinery trading was at a standstill, they said. Open market trading had been confined to these two channels for some time. While some refiners indicated that jobbers had increased their takings against contracts slightly, reports of this nature were the exception. No changes were reported in refiners' quotations.

Wax inquiry was said to be more active. Both the 122-124 and 124-126 A.m.p. grades were offered 0.05 cent lower at 1.95 cents a pound by some sellers while others said they had made small-lot sales at 2.10 cents.

Pennsylvania Refinery Lubricating Oil Inventory

(Issued by National Petroleum Association)

	March 3 Gallons	March 10 Gallons
1. **Raw Long Residuum** (Including all raw long residuum below, and not salable, as 600 fire)	1,304,118	1,275,715
2. **600 Steam Refined** (Includes all steam refined stock commonly sold or used as 600 and as raw material for bright stocks)	7,644,321	7,210,270
3. **Other Steam Refined** (Not included in 1 and 2 above)	5,141,402	5,407,444
4. **Finished Dewaxed Long Res.**	3,455,751	3,506,205
5. **Bright Stock** (Does not include any material reported in 4, above)	19,510,236	21,016,329
6. **Viscous Neutral,** below 180 vis. but not below 142 vis. @ 100	8,691,305	8,511,779
7. **Viscous Neutral,** 180 vis. @ 100 and above	9,639,052	9,645,371

SEABOARD MARKETS, EXPORT AND COASTWISE

All prices on this page are publisher's opinion of open market quotations or sales, for spot shipment (10 to 15 days). In cargo markets, spot shipment is 90 days. Prices in cents per gallon, except heavy fuel oil in dollars per barrel, in tank car lots, f.o.b. refineries or seaboard terminals in districts designated, unless otherwise noted. Federal, state or municipal taxes not included. Prices quoted apply on products made from legally produced crude. Unless otherwise noted, gasoline octane ratings are determined by C.F.R. Motor method, A.S.T.M.D-357-33T; and lubricating oil specifications determined according to A.S.T.M. methods, unless otherwise noted.

Eastern Domestic

(Inter-refinery and export prices not included.)

MOTOR GASOLINE

Prices Effective	Mar. 21	
District:	(a)60-64 Oct.	(a)65 Oct. & Above
N. Y. harbor	6.25 – 6.50	6.50 – 6.75
(b)N.Y.harbor	6.00 – 6.25	6.25 – 6.50
Philadelphia	6.75	6.75
Baltimore	6.75	6.75 – 7.00
Norfolk	7.00 – 7.25	7.25 – 7.50
Wilmington, N. C.	7.00 – 7.25	7.25 – 7.50
Charleston, S. C.	7.00 – 7.25	7.25 – 7.50
Savannah	7.00 – 7.25	7.25 – 7.50
Jacksonville	7.00 – 7.25	7.25 – 7.50
Portland	7.00	7.25
Boston	6.50 – 6.75	6.75 – 7.00
Providence	6.50 – 6.75	6.75 – 7.00

(a) Prices are nominal. (b) Barge lots.

WATER WHITE KEROSINE

District:			
N. Y. harbor	5.75 –6.00	Charleston	6.00
(b)N. Y. harbor	5.625–5.875	Savannah	5.75
Philadelphia	6.00 –6.25	Jacksonville	5.75
Baltimore	6.00	Portland	6.75
Norfolk	6.00	Boston	6.00–6.25
Wilmington, N.C.	6.00	Providence	6.00–6.25

(b) Barge ots.

(c)FUEL OILS

	N. Y. harb.	N. Y. harb. barges
No. 1	5.75 – 6.00	5.625– 5.875
Nos. 2-3	4.75 – 5.00	4.625– 4.75
No. 4	4.75 – 5.00	4.625– 4.75
No. 5	$1.35	.....
No. 6	$1.15	.....

	Phila. dist.	Balt. dist.
No. 1	6.00 – 6.25	6.00
Nos. 2-3	5.00 – 5.25	5.00
No. 4	4.75 – 5.25	5.00
No. 5	$1.35	$1.35
No. 6	$1.15	$1.15

	Bost. dist.	Prov. dist.
No. 1	6.00 – 6.25	6.00 – 6.25
Nos. 2-3	5.00 – 5.25	5.00 – 5.25
No. 4	5.00 – 5.25	5.00 – 5.25
No. 5	$1.35	$1.35
No. 6	$1.15	$1.15

(c) Fuel oils meet specifications of U. S. Commercial Standards CS12-35.

District:	(b)Bunker C Fuel	(b)Diesel Oil
N. Y. harbor	(e)$1.15	(d) $1.95-$2.10
Philadelphia	(e)$1.15	(d)$2.10
Baltimore	(e)$1.15	(d)$2.10
Norfolk	(c)$1.15	$2.10
Charleston	$1.10	$2.10
Savannah	(c)$1.10	$2.205
Jacksonville	(c)$1.10	$2.205
Tampa	(c)$1.05	$2.205
Portland	$1.25	$2.25
Boston	(e)$1.15	(d) $2.10-$2.20
Providence	$1.15	$2.10

(b) In ship's bunkers.
(c) For barging add 5c per bbl.
(d) For barging add 6.5c to 7.5c per bbl.
(e) For barging add 5c to 6c per bbl.

	Gas Oil 28-34 Gravity	Diesel Oil Shore Plants
N. Y. harbor	4.75 – 5.00	4.75 – 5.00
Philadelphia dist.	5.00	....
Baltimore dist.	5.25	....
Norfolk dist.	5.25	....
Savannah dist.	....	5.25
Jacksonville dist.	....	5.25

Pacific Export

(Quotations are at seaboard, Los Angeles, in cargo lots, cents per gal., except where otherwise noted.)

Prices Effective	Mar. 21	Mar. 14
U. S. Motor, under 65 oct.	5.25 – 5.375	5.25 – 5.50
400 e.p. blend, under 65 oct.	5.375– 5.50	5.375– 5.675
400 e.p. blend 65 oct. & above	5.50 – 5.675	5.50 – 5.75
(b)38-40 w.w.kerosine	4.50 – 5.00	4.50 – 5.00
41-43 w.w. kerosine	5.00 – 5.50	5.00 – 5.50
44 w.w. kerosine	5.50	5.50 – 5.75

(b)150 fire point.

Prices Effective	Mar. 21	Mar. 14
In Cargo lots, per bbl.		
Diesel fuel, 24° & above	$1.45 –$1.50	$1.45 –$1.50
Diesel fuel, under 24°	$1.40 –$1.45	$1.40 –$1.45
(b)30-34 diesel(gas oil)	$1.45 –$1.65	$1.45 –$1.65
(c)Grade C fuel oil	$0.80 –$0.90	$0.80 –$0.90

Note: For San Francisco cargo prices, add 5c per bbl. to above cargo prices.

In Ships' Bunkers, or deep tank lots, per bbl.:		
(b)Diesel fuel oil	$1.625–$1.65	$1.625–$1.65
(c)Grade C fuel oil	$0.90 –$1.00	$0.89 –$1.00

(b) Pacific specification 200. (c) Pacific specification 400.

Cased Goods: (Per case)		
U. S. Motor	$1.45 –$1.575	$1.45 –$1.575
400 e.p. blend, under 65 octane	$1.55 –$1.65	$1.55 –$1.65
400 e.p. blend, 65 oct. & above	$1.65 –$1.75	$1.65 –$1.75
(b)40-43 w.w. kerosine	$1.35 –$1.45	$1.35 –$1.45
Kerosine, p.w.	$1.30 –$1.40	$1.30 –$1.40

(b)150 fire point.

New York Export

(Prices in cents per gal. in bbls. F.a.s. New York)

CYLINDER OILS (Pennsylvania Products)

Bright stock:		
Light, 25 p.t.	23.00 –23.50	23.00 –23.50
Dark, 25 p.t.	22.50 –23.00	22.50 –23.00
Neutral oil:		
200 3 color, 25 p.t.	24.50 –25.00	24.50 –25.00
150 3 color, 25 p.t.	22.50 –23.00	22.50 –23.00
600 Warren E filtered.	20.50 –21.00	20.50 –21.00
600 s.r., unfiltered.	16.00 –16.50	16.00 –16.50
650 s.r., unfiltered.	18.00 –18.50	18.00 –18.50
600 fl., s.r.	18.50 –19.00	18.50 –19.00
630 fl., s.r.	21.50 –22.00	21.50 –22.00

Wax, Domestic *and* Export

(Prices in cents per lb. Tests made by A. S. T. M. methods. Melting points shown below, however, are A. M. P., 3° higher than A. S. T. M. (E.M.P.) melting points. Export prices are f.a.s. carload lots. Domestic prices are f.o.b. refineries in New York and New Orleans districts, in bags, carload lots, with 0.2c discount allowed for shipment in bulk. Scale, solid and fully refined, slabs in bags.)

Prices Effective	Mar. 21	
	New York	
	Domestic	Export
124-6 Y.C. scale	1.85 – 2.00	1.85 – 2.00
122-4 W.C. scale	1.90 – 2.00	1.90 – 2.00
124-6 W.C. scale	1.90 – 2.00	1.90 – 2.00
123-5 Fully rfd.	4.30	3.75
125-7 Fully rfd.	4.35	3.875
128-30 Fully rfd.	4.45	4.125
130-2 Fully rfd.	4.55	4.25
133-5 Fully rfd.	(a)5.00	4.75
135-7 Fully rfd.	(a)5.25	5.125
	New Orleans	
	Domestic	Export
124-6 Y.C. scale	1.85 – 2.00	1.85 – 2.00
122-4 W.C. scale	1.90 – 2.00	1.90 – 2.00
124-6 W.C. scale	1.90 – 2.00	1.90 – 2.00
123-5 Fully rfd.	4.30	3.75
125-7 Fully rfd.	4.35	3.875
128-30 Fully rfd.	4.45	4.125
130-2 Fully rfd.	4.55	4.25
133-5 Fully rfd.	(a)5.00	4.75

(b) Shipment either in bags or in bulk.

Gulf Coast

(Prices are f.o.b. ship at Gulf oil terminals representing opinions of traders, except prices specified to the contrary. Prices cover bulk shipments of 20,000 bbls. or more, unless otherwise noted.)

Prices Effective	Mar. 21	Mar. 14
For Domestic shipment:		
MOTOR GASOLINE		
59 oct. & below	(a) 5.00 –5.125	(a) 5.00 –5.125
60-64 oct. number	(a) 5.125–5.375	(a) 5.125–5.375
65-67 octane	(a) 5.25 –5.50	(a) 5.25 –5.50
68-70 octane	(a) 5.375–5.625	(a) 5.50 –5.75
FUEL OILS		
No. 1	4.625– 4.875	4.75 – 5.00
No. 2	3.75 – 4.125	3.875– 4.125
KEROSINE		
41-43 w w	4.50 – 4.75	4.625– 4.875
For Export Shipment:		
GASOLINE		
U. S. Motor	4.75 – 4.875	4.875– 5.00
60-62, 400 e.p.	4.75 – 4.875	4.875– 5.00
61-63, 390 e.p.	4.875– 5.00	5.00 – 5.125
64-66, 375 e.p.	4.875– 5.00	5.00 – 5.125
KEROSINE		
44 w.w.	(a) 4.625–4.875	(a) 4.75 –5.00
41-43 w.w.	4.50 – 4.75	4.625– 4.875
41-43 p.w.	4.50 – 4.75	4.625– 4.875

(a) Nominal.

Prices Effective	Mar. 21	Mar. 14
GAS AND BUNKER OILS		
For Domestic and/or Export Shipment		
(b)26-30 translucent gas oil	3.75 – 4.125	3.875– 4.125
(b)30 plus translucent gas oil	3.75 – 4.125	3.875– 4.125
(b)30 plus transparent gas oil	3.75 – 4.125	3.875– 4.125
Diesel Oil Ship's bkrs.	(c)$1.75	(c)$1.90
Grade C bunker oil for ship's bunkers	(c)$0.85	(c)$0.85
Grade C bunker oil, in cargoes	$0.75 –$0.80	$0.75 –$0.80

(b) Less than ½ of 1% sulphur. (c) Barging 5c bbl. additional at some Gulf ports.

MEXICAN CRUDE AND BUNKER OILS

(F.o.b. Steamer, Tampico)

Heavy Panuco crude, taxes to be paid	(a) $0.88-$0.90	(a) $0.88–$0.90
Grade C bunker oil, ship's bunkers, taxes paid	$0.95	$0.95

(a) Nominal.

MID-CONTINENT LUBRICATING OILS

(Prices in cents per gal. for export shipment, f.o.b. Gulf in bulk, f.a.s. Gulf in bbls.)

	Mar. 21	
190-200 vis. D 210 brt. stock	(b)Barrels	Bulk
	23.50 –24.50	18.00 –20.50
150-160 vis. D 210 brt. stock:		
0-10 p.p.	19.50 –20.50	14.50 –15.00
10-25 p.p.	19.50 –20.00	14.00 –14.50
150-160 vis. E 210 brt. stock	19.00 –20.00	14.00 –14.50
120 vis. D 210 brt. stock:	19.00 –20.00	14.00 –14.50

(b) Second hand barrels

	Mar. 21	Mar. 14
180 vis. No. 3 color neutral:	Bulk	Bulk
0-10 p.p.	8.25	8.25
15-30 p.p.	8.00	8.00
200 vis. No. 3 color neutral:		
0-10 p.p.	8.75	8.75
15-30 p.p.	8.50	8.50
600 s.r. olive green	9.00 –11.25	9.00 –11.25
600 s.r. dark green	7.00 – 9.25	7.00 – 9.25

SOUTH TEXAS LUBRICATING OILS

(Vis. at 100° cold test 0, bulk export shipment, f.o.b Gulf oil terminals.)

Unfiltered Pale Oils:		
Vis. Color		
100 No. 3	5.25 – 5.50	5.25 – 5.50
200 No. 3	7.00 – 7.25	7.00 – 7.25
300 No. 3	7.50 – 7.75	7.50 – 7.75
500 No. 3½	8.50 – 8.75	8.50 – 8.75
750 No. 4	9.00 – 9.25	9.00 – 9.25
1200 No. 4	9.50 – 9.75	9.50 – 9.75
2000 No. 4	9.75 –10.25	9.75 –10.25
Red Oils:		
Vis. Color		
100 No. 5-6	5.25 – 5.50	5.25 – 5.50
200 No. 5-6	7.00 – 7.25	7.00 – 7.25
300 No. 5-6	7.50 – 7.75	7.50 – 7.75
500 No. 5-6	8.50 – 8.75	8.50 – 8.75
750 No. 5-6	9.00 – 9.25	9.00 – 9.25
1200 No. 5-6	9.50 – 9.75	9.50 – 9.75
2000 No. 5-6	9.75 –10.25	9.75 –10.25

Note: Red oil prices shown above cover oils with green cast; prices for blue cast red oils are slightly lower in some cases.

Tanker Rates

(Approximate tanker freight rates to Continental ports, in shillings per ton of 2240 lbs., British sterling; to U. S. ports in cents per bbl.)

Rates Effective March 21

	Crude &/or Fuel		Refined Oil &/or Spirits	
	Last Paid	Owners Ask	Last Paid	Owners Ask
Gulf-U.K./Cont.(b)	19/6	21/-22/	21/	21/-22/
Aruba-U.K./Cont.(b)	18/	18/6-19/6	18/	18/6-19/6
Gulf-N.Atlantic (c) (not E. of N.Y.): Hvy. Crude & Fuel, (10 to 19.9 gravity)	22c	19c	....	....
Light Crude, (30 Grav. or Lighter)	15c	16c-17c	....	....
Gasoline	....	....	18c	18c
Kerosine	....	....	18c	19c
Light Fuel	....	....	18c	20c

(a) Nominal.
(b) Continental ports in range between Bordeaux and Hamburg, both inclusive.
(c) Venezuela loading same rate: Tampico 2c to 3c per bbl. additional.

CRUDE OIL MARKETS

Prices in $ per bbl. of 42 U. S. gals. at the well. A. P. I gravity. Prices are effective as of 7 a. m. of dates as given

EASTERN FIELDS

Posted by Joseph Seep Purchasing Agency

(Effective March 7, 1938, except Corning Sept. 2, 1937)

Penna. Grade Oil in Southwest Penna. Pipe Lines.....$1.71
Penna. Grade Oil in Eureka Pipe Lines (West Virginia).....$1.65
Penna. Grade Oil in Buckeye Pipe Lines (Macksburg, O.).....$1.55
Corning Oil in Buckeye Pipe Lines (Ohio)...$1.27

Posted by Other Companies

Tide Water Associated Oil Co.
Bradford-Allegany district (Penna. and N. Y.) (Effective March 7, 1938).....$2.05
*The Pennzoil Co.: (Effective March 7, 1938)
Penna. Grade Oil in National Transit Lines*$1.98
Ashland Oil & Transportation Co.:
Somerset Oil in Ashland Lines (Ky.):
(Effective Jan. 28, 1937)
Big Sandy River.....$1.42
Kentucky River.....$1.50

*The Pennzoil Co. posts $1.98 in Cochran, Franklin, Hamilton and Doolittle, Pa. fields; prices in other lower districts range down to $1.93 per bbl. at well.

MICHIGAN

Posted by Pure Oil Co.

Midland, Midland County (Jan. 5, 1938)....$1.12

Posted by Simrall Pipe Line Corp.

(Effective Dec. 29, 1937)

West Branch, Arenac, and equal grades.... $0.80

(Effective Jan. 8, 1938)

Beaverton, Crystal, Greendale, Porter and equal grades.....$1.12
Buckeye, Bentley, Billings, Tobacco and equal grades.....$1.095

CENTRAL STATES FIELDS

Posted by Ohio Oil Co.

(Effective Jan. 28, 1937)

Illinois, Princeton.....$1.35
Owensboro (Western Ky.).....$1.40

(Effective Nov. 20, 1937)

Lima, O.....$1.00

Posted by Stoll Oil Refining Co.

(Effective Feb. 1, 1937)

Stoll Pipe Line Oil (Ky.).....$1.40

CANADIAN FIELDS

Posted by Imperial Oil Limited
Western Ontario

(Effective Sept. 9, 1933)

Petrolia.....$2.10
Oil Springs.....$2.17

Alberta—Turner Valley

(Prices f.o.b. field tankage)

(Effective Jan. 5, 1938)

Crude Oil

40-40.9°.....	$1.14	53-53.9.....	$1.40
41-41.9.....	1.16	54-54.9.....	1.42
42-42.9.....	1.18	55-55.9.....	1.44
43-43.9.....	1.20	56-56.9.....	1.46
44-44.9.....	1.22	57-57.9.....	1.48
45-45.9.....	1.24	58-58.9.....	1.50
46-46.9.....	1.26	59-59.9.....	1.52
47-47.9.....	1.28	60-60.9.....	1.54
48-48.9.....	1.30	61-61.9.....	1.56
49-49.9.....	1.32	62-62.9.....	1.58
50-50.9.....	1.34	63-63.9.....	1.60
51-51.9.....	1.36	64-64.9.....	1.62
52-52.9.....	1.38		

Crude Naphtha, 65 grav. & above.....$2.14

Absorption Gasoline

90% Rec., 20 lb. Reid v.p.....$1.94
90% Rec., 17 lb. Reid v.p.....$2.08

MID-CONTINENT

Posted by Stanolind Crude Oil Purchasing Co., Jan. 28, 1937

	(In Oklahoma-Kansas)*	(In North-North Central Texas)
Below 29.....	$1.06	$0.96
29-29.9.....	1.08	0.98
30-30.9.....	1.10	1.00
31-31.9.....	1.12	1.02
32-32.9.....	1.14	1.04
33-33.9.....	1.16	1.06
34-34.9.....	1.18	1.08
35-35.9.....	1.20	1.10
36-36.9.....	1.22	1.12
37-37.9.....	1.24	1.14
38-38.9.....	1.26	1.16
39-39.9.....	1.28	1.18
40 & above....	1.30	1.20

Above Stanolind prices met as follows:

Jan. 28, Continental Oil Co. met in Okla., Kans., and North Texas. Sinclair-Prairie met in North Texas and North Central Texas, Jan. 28, Stanolind's North Texas schedule. Same date, The Texas Co. met in North-North Central Texas.

Note: Stanolind prices in Okla.-Kans. are for quantities computed by 97% tank tables. In Texas, 100% tank tables are used effective Oct. 1, 1937, volume corrected to 60° F., and deduction for full b.s. & w. content.

*Effective Aug. 1, 1937, for Otis-Albert pools Rush-Barton counties, Kans., 13c less.

Posted by Carter Oil Co.
In Oklahoma

(Effective Jan. 28, 1937)

Below 25.....	$0.98	33-33.9.....	$1.16
25-25.9.....	1.00	34-34.9.....	1.18
26-26.9.....	1.02	35-35.9.....	1.20
27-27.9.....	1.04	36-36.9.....	1.22
28-28.9.....	1.06	37-37.9.....	1.24
29-29.9.....	1.08	38-38.9.....	1.26
30-30.9.....	1.10	39-39.9.....	1.28
31-31.9.....	1.12	40 and above...	1.30
32-32.9.....	1.14		

Above Carter schedule met Jan. 28 by the following companies: Sinclair-Prairie, Shell and Bransdall in Oklahoma-Kansas; Skelly Oil in Kansas; Tide Water in Oklahoma; Pure Oil in Oklahoma-Kansas, beginning with below 24 at $0.98 and ending with 40 & above at $1.30.

Posted by Magnolia Petroleum Co.

(Effective Jan. 28, 1937)

In Oklahoma, same schedule as Carter Oil, which see above, beginning with below 25, at $0.98 and ending with 40 & above, at $1.30.

In Texas: North and North Central, including Burkburnett, Archer, Henrietta, Electra, Comanche and Olden, same gravity and price schedule as Stanolind in North Texas, which see under Stanolind, beginning with below 29 at $0.96 and ending with 40 and above, at $1.20.

Beaumont, Tex.

(Effective Oct. 1, 1937)

Below 21°.....	$0.95	27-27.9.....	$1.15
21-21.9.....	0.98	28-28.9.....	1.17
22-22.9.....	1.01	29-29.9.....	1.19
23-23.9.....	1.04	30-30.9.....	1.21
24-24.9.....	1.07	31-31.9.....	1.23
25-25.9.....	1.10	32-32.9.....	1.25
26-26.9.....	1.13	33-33.9.....	1.27
		34 & above.....	1.29

TEXAS FIELDS

Posted by Humble Oil & Refining Co.
(**West Central Texas*)

(Effective Jan. 28, 1937)

Below 29.....	$0.96	35-35.9.....	$1.10
29-29.9.....	0.98	36-36.9.....	1.12
30-30.9.....	1.00	37-37.9.....	1.14
31-31.9.....	1.02	38-38.9.....	1.16
32-32.9.....	1.04	39-39.9.....	1.18
33-33.9.....	1.06	40 and above...	1.20
34-34.9.....	1.08		

*Includes Brown, Callahan, Coleman, Comanche, Eastland, Fisher, Haskell, Jones, Shackelford, Stephens, Throckmorton and Young counties.

Shell Petroleum Corp., effective Jan. 28, posts Humble's above schedule on Fisher county crude, plus these five lower grades, beginning with below 25 gravity at $0.88; 25-25.9, $0.90; 26-26.9, $0.92; 27-27.9, $0.94, and 28-28.9, $0.96; rest of schedule same as Humble's in West Central Texas.

Note: Effective Oct. 1, 1937, Humble prices are based on 100% tank tables at 60F.

East Central Texas

(Effective Jan. 28, 1937)

Below 29.....	$1.03	35-35.9.....	$1.17
29-29.9.....	1.05	36-36.9.....	1.19
30-30.9.....	1.07	37-37.9.....	1.21
31-31.9.....	1.09	38-38.9.....	1.23
32-32.9.....	1.11	39-39.9.....	1.25
33-33.9.....	1.13	40 and above...	1.27
34-34.9.....	1.15		

*Including Anderson, Cherokee, Limestone, Navarro counties.

Same date, Sinclair-Prairie met in Mexia Humble's above schedule.

PANHANDLE TEXAS

Posted by Humble Oil & Refining Co.

(Effective Jan. 28, 1937)

	Gray County	Carson-Hutchinson
Below 35.....	$0.96	$0.91
35-35.9.....	0.98	0.93
36-36.9.....	1.00	0.95
37-37.9.....	1.02	0.97
38-38.9.....	1.04	0.99
39-39.9.....	1.06	1.01
40 & above.....	1.08	1.03

Jan. 28, above prices met by Sinclair-Prairie and Magnolia in the entire area and by Continental in Carson-Hutchinson and by Texas Co. in Panhandle Sweet, same as Humble's Gray Co. and on Panhandle Sour, same as Carson-Hutchinson.

EAST TEXAS

(Effective May 22, 1937)

Stanolind, Humble, Shell, Sinclair-Prairie, Texas Co., and Magnolia.....$1.35

Shell also posted on Jan. 28, in Livingston area, Polk County, Texas, $1.27.

NORTHEAST TEXAS

(Posted by Humble, Jan. 28, 1937)

Talco.....$0.73

(Posted by Magnolia, Jan. 28, 1937)

Cass County and Panola County, Tex.:
Same gravity and price schedule as S. O. Louisiana posts for Rodessa, La., which see under that company.

(Posted by The Texas Co., Jan. 28, 1937)

Cass County.....$1.25

WEST TEXAS AND NEW MEXICO

Posted by Humble Oil & Refining Co.

(Effective Jan. 28, 1937)

(Including Andrews, Crane, Crockett, Ector, Glasscock, Howard, Winkler and Upton Counties, Texas and Lea county, New Mexico).

Below 26.....	$0.78	33-33.9.....	$0.94
26-26.9.....	0.80	34-34.9.....	0.96
27-27.9.....	0.82	35-35.9.....	0.98
28-28.9.....	0.84	36-36.9.....	1.00
29-29.9.....	0.86	37-37.9.....	1.02
30-30.9.....	0.88	38-38.9.....	1.04
31-31.9.....	0.90	39-39.9.....	1.06
32-32.9.....	0.92	40 & above....	1.08

Pecos, West Texas.....$0.91

Jan. 28, Magnolia met Humble in Crane, Upton, Howard, Glasscock, Mitchell and Winkler.

Shell Petroleum Corp., on Jan. 28, met Humble in Crane, Glasscock, Howard, Pecos (except Yates shallow pool), Winkler, and Upton counties, Tex., and in Lea County, N. Mex. On Jan. 28, Shell posted in Yates shallow pool in Pecos county, Tex., $0.81. June 4, 1937, Shell added Ector county to West Texas postings.

Jan. 28, Stanolind Oil & Gas Co. met Humble in Hendrick field, Winkler county.

Jan. 28, Texas Co. met Humble in Ward and Winkler counties, Tex., and Lea County, N. M.

April 20, 1937, Sinclair Prairie met Humble in Ward and Winkler, Tex. and Lea, N. M., counties, except that its gravity schedule ends with 36 and above, at $1.00.

Posted by Continental Oil Co.

(Effective Jan. 28, 1937)

Artesia, Jackson and Maljamar pools, N. M...$0.90

COLORADO

(Posted by Continental Oil Co., Effective Jan. 28, 1937)

Ft. Collins and Wellington

Below 29.....	$1.01	35-35.9.....	$1.15
29-29.9.....	1.03	36-36.9.....	1.17
30-30.9.....	1.05	37-37.9.....	1.19
31-31.9.....	1.07	38-38.9.....	1.21
32-32.9.....	1.09	39-39.9.....	1.23
33-33.9.....	1.11	40 & above.....	1.25
34-34.9.....	1.13		

Cannon City and Florence, Col.....$1.10

SOUTH AND SOUTHWEST TEXAS

All Shown Below Posted by Humble Oil & Refining Co.

(Effective Jan. 28, 1937)

Carroll, Clark, Darst Creek, Hilbig, Salt Flat and Zoboroski fields.....$1.09
Pettus.....$1.37 Van Zandt.....$1.10

Jan. 28, Magnolia met Humble in Darst Creek: posted $1.00 in Luling; $1.12 in Lytton Springs; $1.27 for Cleveland, and $1.15 in Hardin, both in Liberty county, Tex.

Jan. 28, 1937, The Texas Co. met Humble in Darst Creek.

Anahuac, Dickinson, Flour Bluff and Turtlebay

(Effective Jan. 28, 1937)

Below 31.....	$1.16	36-36.9.....	$1.28
31-31.9.....	1.18	37-37.9.....	1.30
32-32.9.....	1.20	38-38.9.....	1.32
33-33.9.....	1.22	39-39.9.....	1.34
34-34.9.....	1.24	40 and above....	1.36
35-35.9.....	1.26		

Conroe, Raccoon Bend (Deep sand crude) Tomball and Satsuma

(Effective Jan. 28, 1937)

Below 29.....	$1.20	35-35.9.....	$1.34
29-29.9.....	1.22	36-36.9.....	1.36
30-30.9.....	1.24	37-37.9.....	1.38
31-31.9.....	1.26	38-38.9.....	1.40
32-32.9.....	1.28	39-39.9.....	1.42
33-33.9.....	1.30	40 & above.....	1.44
34-34.9.....	1.32		

Jan. 28, Magnolia met Humble in Tomball and Texas Co. met Humble in Conroe, beginning with 35-35.9 gravity.

(Continued on next page)

CRUDE OIL MARKETS

(Continued from preceding page)

South-Southwest Texas (cont'd)

Posted by Humble

***Mirando**

(Effective July 6, 1937)

Below 21	$0.96	31-31.9	$1.18
21-21.9	0.98	32-32.9	1.20
22-22.9	1.00	33-33.9	1.22
23-23.9	1.02	34-34.9	1.24
24-24.9	1.04	35-35.9	1.26
25-25.9	1.06	36-36.9	1.28
26-26.9	1.08	37-37.9	1.30
27-27.9	1.10	38-38.9	1.32
28-28.9	1.12	39-39.9	1.34
29-29.9	1.14	40 & above	1.36
30-30.9	1.16		

*Includes Duval, Jim Hogg, Webb and Zapata counties, Tex. and Heyser and Placedo crudes.

July 6, Magnolia posted same schedule as Humble in Mirando.

July 6, 1937, Texas Co. posted for Duval-Mirando, $0.96 for below 21, plus 2c differential, to $1.12 for 28 & above.

LOUISIANA-ARKANSAS

Posted by Standard Oil Co. of Louisiana

	*N. La.-Ark.	Rodessa, La.	So. La. Roanoke N. Crowley
	(Effective Jan. 28, 1937)		(Dec. 28,'37)
Below 21°	$0.90	$0.93	$0.90
21-21.9	for	for	.93
22-22.9	oil	oil	.96
23-23.9	Below	Below	.99
24-24.9	25°	25°	1.02
25-25.9	$0.92	$0.95	1.05
26-26.9	.94	.97	1.08
27-27.9	.96	.99	1.10
28-28.9	.98	1.01	1.12
29-29.9	1.00	1.03	1.14
30-30.9	1.02	1.05	1.16
31-31.9	1.04	1.07	1.18
32-32.9	1.06	1.09	1.20
33-33.9	1.08	1.11	1.22
34-34.9	1.10	1.13	1.24
35-35.9	1.12	1.15	1.26
36-36.9	1.14	1.17	1.28
37-37.9	1.16	1.19	1.30
38-38.9	1.18	1.21	1.32
39-39.9	1.20	1.23	1.34
40 & above	1.22	1.25	1.36

*Includes Caddo, Homer, Haynesville, Sabine, De Soto, Sarepta, Carterville, El Dorado, Bunkie and Miller county.

Smackover, Ark. $0.90

Urania, La. (Arkansas Fuel Oil Co., Jan. 28, '37) $1.02

Tepetate, La. (Continental Oil, Jan. 28, '37) ... 1.24

Jan. 28, 1937, Magnolia met S. O. La.'s No. La.-Ark. gravity and price schedule in Pine Island, Haynesville, Bull Bayou and Cotton Valley, La., and in Eldorado and Rainbow districts, Ark.; and met S. O. La.'s Rodessa prices; and in Lockport, Iowa, Cameron Meadow, La., posted Humble's gravity and price schedule on Mirando. El Dorado East Field, Ark. price same as Smackover, effective Jan. 28, '37.

Jan. 28, The Texas Co. met S. O. La. in N. La., except that its gravity schedule begins with below 27 at $0.94. It posted $1.37 for Garden Island, La., $1.24 for LaFitte, La. and $0.90 for Smackover.

***GULF COASTAL FIELDS**

Posted by Humble Oil & Refining Co. and The Texas Co.

	Humble	Texas	Saxet (Humble) (July 6 '37)
	(Effective Jan. 28, 1937)		
Below 18	$0.95	$0.90	....
18-18.9	for	0.92	....
19-19.9	below	0.94	....
20-20.9	21°	0.96	$1.01
21-21.9	0.98	0.98	1.03
22-22.9	1.01	1.01	1.05
23-23.9	1.04	1.04	1.07
24-24.9	1.07	1.07	1.09
25-25.9	1.10	1.10	1.11
26-26.9	1.13	1.13	1.13
27-27.9	1.15	1.15	1.15
28-28.9	1.17	1.17	1.17
29-29.9	1.19	1.19	1.19
30-30.9	1.21	1.21	1.21
31-31.9	1.23	1.23	1.23
32-32.9	1.25	1.25	1.25
33-33.9	1.27	1.27	1.27
34-34.9	1.29	1.29	1.29
35-35.9	1.31	for	1.31
36-36.9	1.33	oil	1.33
37-37.9	1.35	34°	1.35
38-38.9	1.37	and	1.37
39-39.9	1.39	above.	1.39
40 and above	1.41	....	1.41

†Refugio

(Effective July 6, 1937)

Posted by Humble

20-20.9	$1.01	23-23.9	$1.07
21-21.9	1.03	24-24.9	1.09
22-22.9	1.05	25-25.9	1.11

Rest of schedule same as Humble's Gulf Coastal crude prices.

†Includes Saxet, Greta, O'Connor-McFadden, Taft, Plymouth and Tom O'Connor crude.

*Humble's prices apply in these Texas fields: Amelia, Barbers Hill, Goose Creek, Hull, Liberty, Mykawa, Orange, Pierce Junction, Raccoon Bend, (shallow sand), Sugarland, Thompsons, and West Columbia. Same prices also apply, effective Feb. 1, 1938, in Clinton, Tex., posted by Stanolind Crude Oil Purch. Co.

Jan. 28, Sinclair-Prairie met above Humble schedule in full.

July 6, 1937, The Texas Co. posted for Refugio, which includes Greta, Saxet and Taft: $1.01 for below 21, plus 2c differential, to $1.17 for 28 & above.

Texas Co. postings in Gulf Coastal Texas include: Arriola, Five Corners, Ganado, Humble, Liberty, Magnet, Manvel, Markham, Mauritz, McFaddin, Pickett Ridge, Port Neches, Sour Lake, West Columbia and Withers. In Gulf Coastal Louisiana: Bay St. Elaine, Caillou Island, Dog Lake, Four Isle, Gillis, Horseshoe Bayou, Iberia, Lake Barre, Lake Pelto, Leesville and Port Barre.

ROCKY MOUNTAIN FIELDS

Posted by Stanolind Oil & Gas Co.

(Effective Jan. 28, 1937)

Salt Creek, (except Tensleep crude), Midway and Dutton Creek, Wyo., same schedule as Stanolind posts in Oklahoma, Kansas which see under Mid-Continent crude on previous page.

(Effective Jan. 6, 1938)

Tensleep, Salt Creek field $0.70

(Effective Jan. 28, 1937)

Greybull-Torchlight	$1.30
Iles, light, Col	1.18
Iles, heavy	1.12
Hogback, N. M	1.33
Big Muddy	1.23
Elk Basin, light	1.30
Grass Creek, light	1.30
Frannie light	0.82

(Effective Nov. 4, 1936)

Grass Creek, heavy	$0.62
Frannie heavy	0.62
Hamilton Dome, Wyo.	0.57

Posted by Ohio Oil Co.

(Effective Jan. 28, 1937)

Elk Basin, Wyo.	$1.30
Grass Creek, light	1.30
Rock Creek	1.205
Lance Creek	0.97

(Effective Nov. 16, 1937)

Sunburst, Mont.	$0.90

Posted by Continental Oil Co.

(Effective Jan. 1, 1938)

Cat Creek, Mont.	$1.30

(Effective Jan. 28, 1937)

Big Muddy, Wyo.	1.18
Lance Creek, Wyo.	0.97

CALIFORNIA, *Posted by Standard Oil of California*

All gravities above those quoted take highest price offered in the field. Prices effective Feb. 26, 1936, except Huntington Beach, Playa del Rey, Santa Fe Springs, Kern Front, Signal Hill (Long Beach) effective March 7, 1936; Elk Hills effective June 22, 1936; Lakeview Area, Aug. 19, 1936; El Segundo and Wilmington, Oct. 15, 1937; Greeley-Canal, Dec. 22, 1937.

Gravity	Signal Hill (Long Beach) El Segundo †Wilmington	Seal Beach	Alamitos Heights	Huntington Beach	Inglewood	Playa del Rey	Ollinda Bres Canon	Athens Rosecrans	Dominguez	Torrance	Richfield	Whittier East Coyote (La Habra)	Montebello	West Coyote Hills	Santa Fe Springs	‡Newhall and others	Mountain View	Elk Hills	Buena Vista Hills Midway-Sunset Lakeview Area	Greeley-Canal (Kern County)	Lost Hills	Coalinga	Wheeler Ridge
14-14.9	$0.80	0.79	0.74	0.78	0.79	0.80	0.76	....	....	0.80	0.76	0.76	0.77	0.78	....	0.70	....	0.70	0.70	.....	0.70	0.70	....
15-15.9	.80	.79	.74	.78	.79	.80	.76	....	....	.80	.76	.76	.77	.78	....	.70	....	.70	.70	.....	.70	.70	....
16-16.9	.80	.79	.74	.78	.79	.80	.76	....	....	.80	.76	.76	.77	.78	....	.70	....	.70	.70	.....	.70	.70	....
17-17.9	.80	.79	.74	.78	.81	.80	.76	....	....	.80	.76	.76	.77	.78	....	.70	....	.70	.70	.....	.70	.70	....
18-18.9	.80	.79	.74	.78	.84	.80	.78	....	....	.82	.76	.76	.77	.78	....	.70	....	.70	.70	.....	.70	.70	....
19-19.9	.82	.79	.74	.82	.87	.84	.81	....	....	.85	.76	.78	.77	.78	....	.70	.70	.74	.74	.....	.74	.71	.70
20-20.9	.85	.79	.74	.85	.90	.88	.84	....	....	.88	.78	.82	.77	.80	....	....	.70	.78	.78	.....	.78	.72	.70
21-21.9	.88	.79	.74	.89	.93	.93	.88	....	....	.91	.80	.85	.77	.84	.78	....	.73	.82	.82	.....	.82	.74	.70
22-22.9	.92	.82	.74	.92	.96	.98	.92	....	....	.93	.84	.89	.79	.88	.78	....	.77	.87	.87	.....	.86	.78	.72
23-23.9	.95	.86	.77	.96	.99	1.02	.96	.84	.79	.96	.88	.93	.82	.92	.78	....	.80	.92	.92	.....	.90	.82	.76
24-24.9	.99	.91	.80	1.00	1.02	1.05	.99	.88	.81	.99	.91	.96	.85	.96	.82	....	.84	.97	.97	.....	.94	.86	.79
25-25.9	1.03	.95	.82	1.03	1.05	1.11	1.03	.93	.83	1.02	.95	....	.89	.99	.86	....	.88	1.01	1.01	.....	.98	.90	.83
26-26.9	1.06	1.00	.85	1.07	1.09	1.16	1.06	.98	.86	1.05	.98	....	.92	1.03	.90	....	.91	1.06	1.06	.....	1.02	....	....
27-27.9	1.10	1.05	.88	1.11	1.12	....	1.10	1.03	.88	....	1.02	....	.96	1.06	.95	....	.95	1.10	1.10	$0.84	1.06	....	....
28-28.9	1.14	1.10	.90	1.14	1.15	....	1.14	1.07	.90	....	1.06	....	.99	1.10	.99	....	.99	1.15	1.15	88	1.10	....	....
29-29.9	1.17	1.15	.93	1.18	1.18	....	1.17	1.12	.93	....	1.09	....	1.03	1.14	1.03	....	1.02	1.20	1.20	.92	1.14	....	....
30-30.9	1.21	1.19	.95	1.22	1.21	....	1.21	1.17	.95	....	....	....	1.07	1.17	1.08	....	1.06	1.25	1.25	.95	1.18	....	....
31-31.9				....	1.24	....	1.24	1.22	.97	....	....	....	1.11	1.21	1.12	....	1.09	1.29	1.29	99			
32-32.9		*Elwood Terrace		....	1.27	....	1.27	1.27	1.00	....	....	....	1.14	1.25	1.16	....	1.13	1.34	1.34	1.03	Kettleman Hills		
33-33.9	....	1.28	....	....	....	....	....	1.32	....	....	....	....	1.18	1.28	1.20	....	1.17	1.38	1.38	1.07	....	1.19	....
34-34.9	....	1.32	....	....	....	....	....	1.37	....	....	....	....	1.22	1.32	1.25	....	1.20	....	....	1.11	....	1.23	....
35-35.9	....	1.35	....	....	....	....	....	1.42	....	....	....	....	1.25	....	1.29	....	....	....	....	1.15	....	1.27	....
36-36.9	....	1.39	....	....	....	....	....	1.46	....	....	....	....	1.29	....	1.33	....	....	....	....	1.19	....	1.31	....
37-37.9	....	1.43	....	....	....	....	....	1.51	....	....	....	....	1.32	....	1.37	....	....	....	....	1.23	....	1.35	....
38-38.9	....	....	....	....	....	....	....	1.56	....	....	....	....	1.36	....	1.42	....	....	....	....	1.27	....	1.39	....
39-39.9	....	....	....	....	....	....	....	1.61	....	....	....	....	1.40	....	....	....	....	....	....	1.31	....	1.43	....
40-40.9	....	....	....	....	....	....	....	1.66	....	....	....	....	1.43	....	....	....	....	....	....	1.34	....	....	....
41-41.9	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1.38	....	....	....
42-42.9	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1.41	....	....	....
43-43.9	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1.45	....	....	....
44-44.9	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1.49	....	....	....
45-45.9	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1.53	....	....	....
46-46.9	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1.56	....	....	....
47-47.9	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1.60	....	....	....
48-48.9	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1.64	....	....	....

F. O. B. Standard Pipe Line

*F. o. b. ship.

‡Also McKittrick, Kern River. Kern Front and Round Mountain $0.70 thru 19.9 gravity; no higher gravity quoted.

†Wilmington prices differ on gravities below 18.9. Prices are: 14-16.9, $0.75; 17-17.9, $0.77; and 18-18.9, $0.79; rest of schedule same as Signal Hill.

CLASSIFIED

For Sale

SERVICE AND BULK STATION combined, located on R. R. Now handling major brand but could run cutrate. A. B. James, Rockford, Ill.

FOR SALE

TWO 20,000 gallon gasoline tanks and six 6,000 gallon tank car lubricating oil tanks; 600 galvanized steel and heavy steel drums.

I. O. Co., Box 318
Mansfield, Ohio

Business Opportunities

SALES MANAGER

Manufacturers forming separate corporation handling national sales in complete line Alloyed Oil Products requires man of character with sufficient capital to take financial interest. Exceptional opportunity. Give full particulars.

Address Box 508.

SALE AND PURCHASE
of
GASOLINE-and-OIL COMPANIES
BULK PLANTS and
JOBBING CONCERNS
Confidentially Negotiated
WM. WISHAR
Broker of Oil Marketing Properties
2331 Grandview, Cleveland Heights, O.

Professional Services

ANTI-KNOCK VALUES DETERMINATIONS
The Gray Industrial Laboratories
Chemists and Engineers
Specialists on Petroleum Products
961-976 Frelinghuysen Ave.,
NEWARK, N. J.
Telephone Bigelow 3-4020

PHOENIX CHEMICAL LABORATORY
An Exclusive Petroleum Testing Laboratory
Equipped For All Known Tests & Research in Petroleum Products
3953 Castello Ave., Chicago
Telephone—Spalding 3578

ROYAL E. BURNHAM
Attorney-at-Law
Patent and Trade Mark Practice Exclusively
511 Eleventh Street, N. W.
Washington, D. C.

Miscellaneous

WHAT IT COSTS

"For Sale," "Wanted to Buy," "Help Wanted," "Business Opportunities," "Miscellaneous" classifications, set in type this size without border—10 cents a word. Minimum charge, $3.00.

"Position Wanted"—5 cents a word. Minimum charge $1.00.

Advertisements set in special type or with border—$4.00 per column inch.

Copy must reach us not later than Saturday preceding date of issue.

All advertisements carried on this page are payable in advance.

Index to Advertisers

This index is published as a convenience to the reader. Every care is taken to make it accurate, but National Petroleum News assumes no responsibility for errors or omissions.

Acheson Colloids Corp. 47
Alemite .....
Allis Co., Louis .....
Aluminum Co. of America 35
American Mineral Spirits Co. .....
American Telephone & Telegraph Co. .....
Anderson-Prichard Oil Co. 2

Bakelite Corp. .....
Battenfeld Grease & Oil Corp. .....
Berry Sons' Co., James B. 50
Blackmer Rotary Pump Co. .....
Bowser & Co., Inc., S. F. .....
Bradford Oil Refg. Co. .....
Brodie Co., Inc., Ralph N. .....
Brookins Manufacturing Co. .....
Buckeye Iron & Brass Works .....
Butler Manufacturing Co. .....

Canfield Oil Co. .....
Champion Spark Plug Co. .....
Champlin Refg. Co. .....
Chevrolet Motor Division, General Motors Sales Corp. .....
Chicago Bridge & Iron Co. .....
Cincinnati Ball Crank Co. .....
Cities Service Oil Co. .....
Conewango Refg. Co. 46
Curtis Pneumatic Machinery Co. ....
Cushing Refg. & Gasoline Co. .....

Davis Welding & Mfg. Co. .....
Deep Rock Oil Corp. .....
du Pont de Nemours & Co., E. I. .....
Dyestuff & Chemicals, Inc. .....

Edwards & Co., Vincent .....
Electric Hose & Rubber Co. .....
Electric Storage Battery Co. 37
Erie Meter Systems, Inc. .....
Ethyl Gasoline Corp. .....
Exide Batteries 37

Fairbanks-Morse & Co. .....
Farrell Mfg. Co. .....
Ford Motor Co. .....
Freedom Oil Works Co. .....
Fruehauf Trailer Co. .....

Gaylord Container Corp. .....
General American Transportation Corp. .....
General Electric Co. .....
Goodall Rubber Co. 49
Goodrich Rubber Co., B. F. 3, 28, 29
Goodyear Tire & Rubber Co. 39
Graver Tank & Mfg. Co., Inc. .....
Gray & Lampel, Inc. 45
Gulf Oil Corp. .....

Hays Mfg. Co. .....
Heekin Can Co. .....
Hinde & Dauch Paper Co. .....

Industrial Oil Corp. .....
International Harvester Co. .....
International Petroleum Exposition

Johnson Co., S. T. .....
Johnston & Jennings Co. .....

Kidde & Co., Inc., Walter .....

Leland Electric Co. .....

McDonald Mfg. Co., A. Y. 1
Master Electric Co. .....
Mid-Continent Petroleum Corp. ..... Fourth Cover
Miller Tires .....
Morrison Bros. .....

National Meter Co. .....
National Petroleum Mutual Fire Insurance Co. .....
National Pumps Corp. .....
Neptune Meter Co. .....
New York Lubricating Oil Co. .....

Ohio Oil Co. 55
Oil Equipment Mfg. Co. .....
Overhead Door Corp. .....

Paraflow .....
Pennsylvania Grade Crude Oil Assn.
Penola, Inc. 41
Philadelphia Valve Co. 4
Phillips Petroleum Co. .....
Pittsburgh Equitable Meter Co. .....
Pittsburgh Plate Glass Co. 52
Pure Oil Co. .....
Pyroil Co. 51

Republic Oil Co. .....
Roper Corp., Geo. D. 43

Service Station Equipment Co. .....
Shand & Jurs Co. .....
Shell 7
Skelly Oil Co. 5
Smith Meter Co. 6
Southern Steel Barrel Co. .....
Southwest Pump Co. .....
Standard Oil Co. of N. J. .....
Standard Steel Works .....
Stewart-Warner Corp. .....
Sun Oil Co. .....

Texas Co., The .....
Thiokol Corp. .....
Tokheim Oil Tank & Pump Co. ..... Second Cover

U. S. Air Compressor Co. ....Third Cover
U. S. Steel Corp. .....
Universal Oil Products Co. 27

Viking Pump Co. .....

Wayne Pump Co. .....

Coming Meetings

Society of Automotive Engineers, National Passenger Car Meeting, Hotel Statler, Detroit, Mich., March 28, 29 and 30.

Independent Oil Men's Assn. of New England, annual convention, Bradford Hotel, Boston, Mass., April 7.

Oil Burner Institute, annual meeting, Palmer House, Chicago, Ill., April 11 and 12.

National Petroleum Assn., Cleveland, Ohio, April 13 to 15.

Petroleum Industry Electrical Assn., Rice Hotel, Houston, Texas, April 13, 14 and 15.

American Petroleum Institute, division of production, Eastern District, William Penn Hotel, Pittsburgh, Pa., April 14 and 15.

Society of Automotive Engineers, Inc., National Tractor meeting, Schroeder Hotel, Milwaukee, Wis., April 14 and 15.

American Chemical Society, Dallas, Texas, April 17 to 21.

American Petroleum Institute, division of production, Pacific Coast district, spring meetings, Biltmore Hotel, Los Angeles, Calif., April 19.

Greater New York Safety Council, Hotel Astor, New York City, April 19, 20, 21.

American Institute of Mining and Metallurgical Engineers, Open Hearth Conference, Buffalo, N. Y., April 20, 21 and 22.

The Credit Men's Association of Eastern Pa., Petroleum Refiners & Marketers Credit Groups of Eastern and Western Pa., Penn-Harris Hotel, Harrisburg, Pa., April 25 and 26.

Western Petroleum Refiners Assn., 26th annual meeting, Hotel Arlington, Hot Springs, Ark., April 25, 26 and 27.

Society of Automotive Engineers, Inc., Sectional-Regional Transportation & Maintenance meeting. (Public Utility Fleet Operations), Hotel Statler, Cleveland, Ohio, April 28 and 29.

Fuel Oil Distributors Assn. of N. J., third annual convention, Hotel Berkeley Carteret, Asbury Park, N. J., May 5 and 6.

American Gas Assn., Natural Gas Dept., annual convention, New Orleans, La., May 9 to 12.

Natural Gasoline Assn. of America, 17th annual convention, Hotel Tulsa, Tulsa, May 11 to 13.

National Oil Scouts Assn. of America, Tulsa, Okla., May 12, 13 and 14.

International Petroleum Exposition, Tulsa, Okla., May 14 and 21.

American Petroleum Institute, mid-year meeting, Allis and Lassen Hotels, Wichita, Kans., May 23, 24 and 25.

7th Annual Petroleum and Natural Gas Conference, Penna. State College, Penna. Grade Crude Oil Assn., and Penna. Natural Gas Men's Assn., State College, Pa., May 27, 28.

Society of Automotive Engineers, summer meeting, The Greenbrier, White Sulphur Springs, W. Va., June 12 to 17.

American Society of Mechanical Engineers, national oil and gas power meeting, Dallas, Texas, June 15 to 18.

Pennsylvania Grade Crude Oil Assn., William Penn Hotel, Pittsburgh, Pa., June 16, 17 and 18.

Thiokol Moves

General offices and laboratory of Thiokol Corporation, manufacturers of synthetic rubber, will be located, effective April 1, at 870 Clinton Ave., Trenton, N. J. The company's plant and offices have been located in Yardsville, N. J., for seven years.

ERIODICAL
TECH
TECH.
PUBLIC LIBRARY
MAR 31 1938
DETROIT

NATIONAL PETROLEUM NEWS

Women In Clean Rest Room Crusade
PAGE 25

Dismissal Motions Argued in Madison Case
PAGE 9

Restore Group 3 Rate Parity, Refiners Ask
PAGE 9

Salt Water May Cause Huge E. Texas Oil Loss
PAGE 11

Don't Work; Pass Law Making Oil Support You
(Editorial by Warren C. Platt, Editor) PAGE 14

Winning Dealer Support for Private Brand
PAGE 32

World's Swankiest Gasoline Service Station
PAGE 40

MARCH 30, 1938

THIS ATTRACTIVE ERIE PACKAGE COSTS VERY LITTLE PER GALLON

ERIE BUILDS GOOD PUMPS··LOOK AT ERIE ERIE METER SYSTEMS

Outside and Inside—MECHANICALLY PERFECT!

LIGHT TERMINAL BOX

BRASS ELBOW UNION

1" COPPER TUBING

COMPUTING MECHANISM

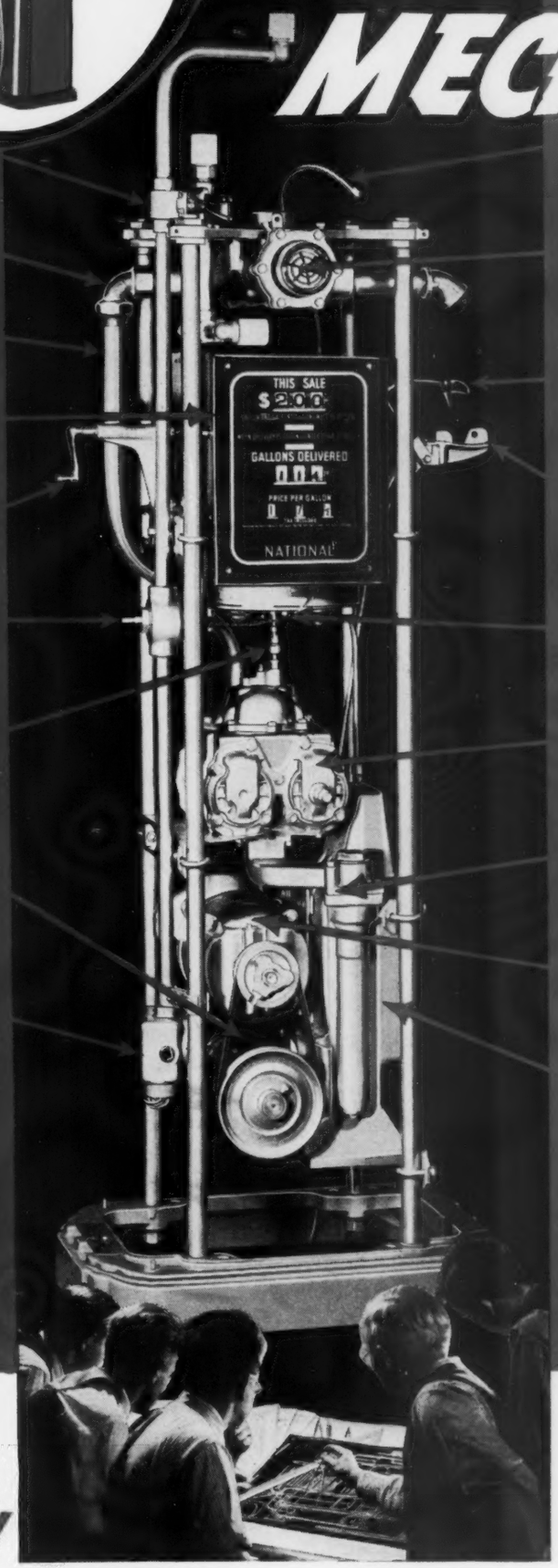
COMPUTER RESET CRANK

LIGHT SWITCH

METER UNIVERSAL

PUMPING UNIT

LIGHT & MOTOR CONDUIT BOX



VENT FROM AIR ELIMINATOR

NEW-TYPE VISI-FLOW

MOTOR SWITCH LEVER

NOZZLE HOOK

SHUTTER CONTROL CHAIN

NATIONAL PISTON METER or PITTSBURGH METER Optional

CHECK & RELIEF VALVE HOUSING

MOTOR 1/3 H.P.

AIR ELIMINATOR

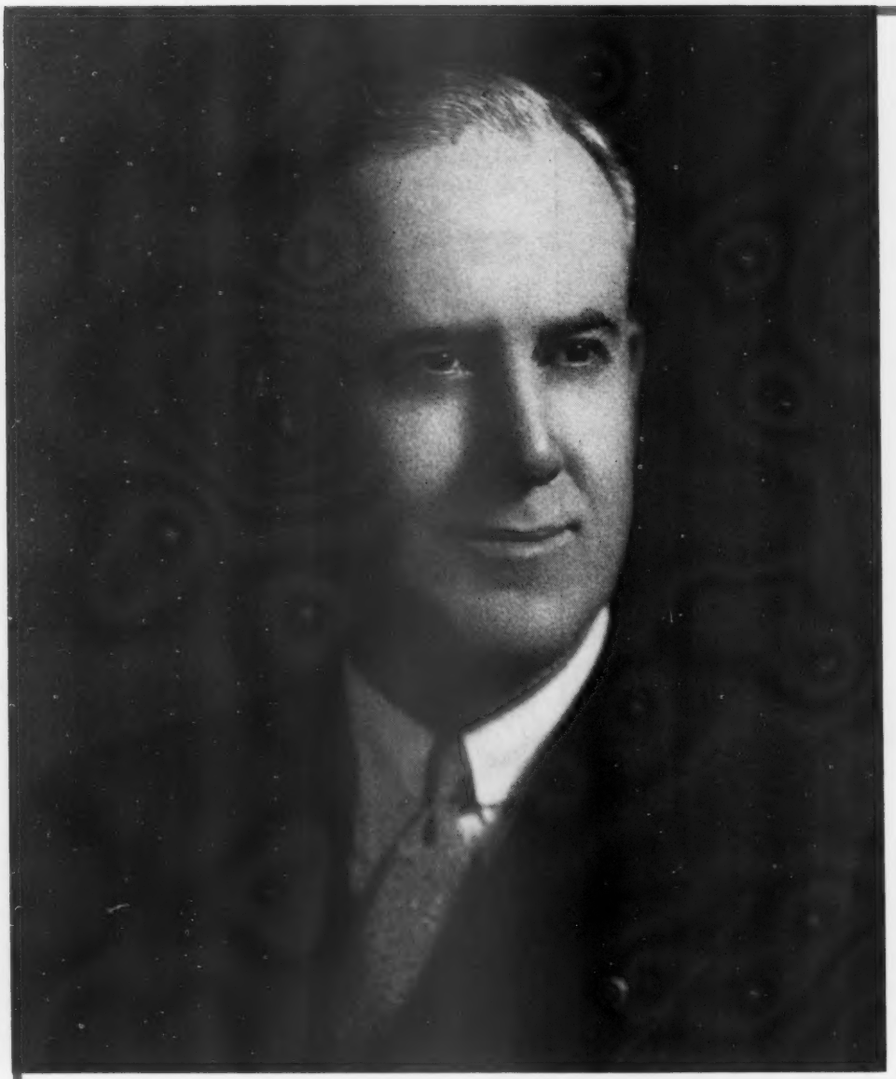
NATIONAL

COMPUTAPEX A-38

The Pump YOU Helped Design

WRITE FOR FULL DETAILS TODAY

NATIONAL PUMPS CORP., *Factory,* **DAYTON, O.,** *Executive Offices,* **CINCINNATI, O.**



Arthur M. Stephens

Arthur M. Stephens, general traffic manager and a director of the Standard Oil Co. (Kentucky), recently has been named general chairman of the Ohio Valley Transportation Board. The board is one of 13 designed to effect mutual understanding between the railroads and shippers of the country.

A native Kentuckian, he first entered the transportation field in the freight traffic department of the Louisville & Nashville Railroad in 1908. His service with Standard of Kentucky dates from Oct. 1, 1918, when he entered its traffic department as chief clerk.